

# DICTIONARY *of* CINEMATOGRAPHY *and Sound Recording*

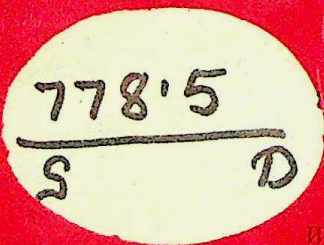


WILLIAM S. SHARPS · M.B.E.S. · F.I.N.S.T.D.

*With comprehensive data section including*

BASIC SHOTS · STAGING AND SPECIAL EFFECTS · FILMING IN  
COLOUR · CALCULATOR TABLES · PERSPECTIVE AND ANGLE OF  
VIEW · TELEPHOTO AND ZOOM LENSES · MICROPHONES · TAPE  
RECORDERS · LIGHT AND LIGHTING EQUIPMENT · PROCESSING  
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DICTIONARY OF CINEMATOGRAPHY  
AND SOUND RECORDING





# Dictionary of Cinematography and Sound Recording

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*by*

WALLACE S. SHARPS

M.B.K.S. • F.INST.D.



FOUNTAIN PRESS • LONDON



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First Published 1959

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46-47 Chancery Lane, London W.C.2

*This volume is dedicated to my daughter, Denise,  
who at two years of age is asking for everything in sight  
to be explained and defined*

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PRINTED IN GREAT BRITAIN BY HEADLEY BROTHERS LTD  
109 KINGSWAY LONDON WC2 AND ASHFORD KENT

# CONTENTS

## *Part I*

|   |                                                                                                                                                                                              |    |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1 | USING THE CAMERA                                                                                                                                                                             | 9  |
|   | Taking Cameras Abroad (9) Film Language (10) Staging Effects (11) Masks and Special Effects (12)                                                                                             |    |
| 2 | COLOUR IN FILMING                                                                                                                                                                            | 17 |
|   | The Colour Chart (18)                                                                                                                                                                        |    |
| 3 | GENERAL DATA                                                                                                                                                                                 | 19 |
|   | Conversion Table for Speed Numbers (20) Narrow-gauge film dimensions (21) Frame/Footage Calculator (22) Frame/Time Calculator (23) Time/Footage Calculator (24) Footage/Time Calculator (26) |    |
| 4 | THE CAMERA EYE                                                                                                                                                                               | 28 |
|   | Focal Length (28) Depth of Focus (30) Depth of Field (31) Perspective and Angle of View (32) Telephoto Lenses (35) Zoom Lenses (36)                                                          |    |
| 5 | SOUND                                                                                                                                                                                        | 37 |
|   | Using Microphones (38) Film Sound Tracks (39) Playing Time for Twin-track Tape Recorders (42)                                                                                                |    |
| 6 | LIGHT AND LIGHTING EQUIPMENT                                                                                                                                                                 | 43 |
|   | The Nature of Light (43) Film Speed and Colour Sensitivity (44) Over-run Light Sources (47) Lamps and Reflectors (49) Lighting Reflective Objects (52)                                       |    |
| 7 | PROCESSING AND EDITING                                                                                                                                                                       | 53 |
|   | Exposure and Density (53) Film Editing (56) Travelling Mattes (58)                                                                                                                           |    |
| 8 | LEADERS AND SPLICING                                                                                                                                                                         | 59 |
|   | The Academy Leader (59) Checking Splices (59) The Splicing of Cine Film with Perforation Overlap (62)                                                                                        |    |
| 9 | FILM PROJECTION                                                                                                                                                                              | 65 |
|   | Selecting a Screen (65) Four Tips on Film Care (66) Lens Projection Data (68) Seating the Audience (72)                                                                                      |    |

## *Part II*

|                                                  |    |
|--------------------------------------------------|----|
| DICTIONARY OF CINEMATOGRAPHY AND SOUND RECORDING | 75 |
|--------------------------------------------------|----|



## ACKNOWLEDGEMENTS

- The author gratefully acknowledges the undermentioned original sources of illustrations in this book.
- Cine Data Book. *R. H. Bomback*. Published Fountain Press, 1950. Figures 11, 13, 14, 15, 16, 17, 18.
- Techniques of Television Production. *Rudy Bretz*. Published McGraw-Hill Book Co. Inc., 1953. Figures 2, 3, 7, 8, 9, 28, 31.
- British Standards Institution. Figure 54.
- Special Effects in Cinematography. *H. A. V. Bulleid*. Published Fountain Press, 1954. Figure 5.
- J. H. Dallmeyer Ltd. Figures 57, 60, 61, 62
- Cine-Film Projection. *C. A. Hill*. Published Fountain Press, 1952. Figure 56.
- Kinocrat Films Ltd. Figure 1.
- Kodak Ltd. Figures 44, 45, 50, 51, 55, 63.
- Pye Ltd. Figures 40, 41, 42, 43.
- Designing for Television. *R. J. Wade*. Published Farrar, Straus and Cudahy, 1952. Figure 6.
- Principles of Cinematography. *L. J. Wheeler*. Published Fountain Press, 1953. Figures 4, 12, 30, 33, 34, 52.

## PART I





# 1

## USING THE CAMERA

### Taking Cameras Abroad

IN GENERAL, there are few restrictions on the temporary import into European countries of a tape recorder or a single camera and its necessary accessory apparatus and sufficient film for holiday use. However, the particular regulations for each country are subject to variation at short notice, and so it is advisable to contact the embassy or consulate concerned, immediately prior to departure. They and your travel agent can also help with advice on scenic attractions, historic buildings, local events and other special items of photographic interest. Useful technical information on availability of film, processing facilities and so on, can usually be obtained from the information departments of the various technical journals.

If one takes foreign made apparatus abroad, the Customs men show a natural interest in it on one's return. They are reasonable, but it is up to the owner to show that duty and any necessary purchase tax was paid on original importation. This requirement can be satisfied quite simply by the production of a receipt on a known dealer's billhead, giving the date of sale and a full description of the items concerned, together with any serial numbers. And don't forget that lens serial numbers *must* be quoted.

In any other case, one must either have sufficient documentary evidence of duty having been paid by showing a customs receipt, etc., or the apparatus will be impounded. This temporary confiscation can be challenged within one month of seizure by giving notice in writing and the case will then go for decision before a magistrate. The penalties for attempting to evade duty are justifiably heavy, but in general one finds that in many journeys abroad, collecting together a few papers saves an awful lot of unnecessary fuss at borders.



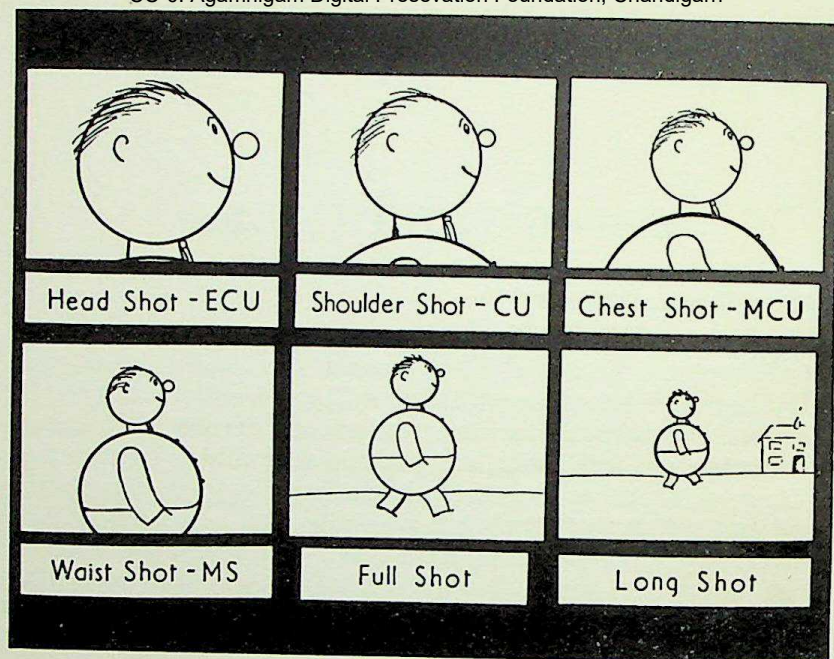


Fig. 1. Basic shots employed in filming and telecasting

### Film Language

The language of filming has grown almost imperceptibly since the early days when Friese-Greene cranked the handle of his moving picture machine in Hyde Park. From the start, the vocabulary was international, but some terms came to mean different things according to the territory of use and even varied in use between studios. The Dictionary at the end of this volume describes most of them in such a manner as to cover all definitions in the English-speaking world.

One of the most important sets of terms are those concerned with camera shots and these are often the subject of misconception. The illustration (Fig. 1) above defines some of the most common shots precisely, and in making out a shooting script or other camera

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advice, one must be careful to adhere strictly to the same standard definitions.

BCU = Big close-up = ECU = Extra close-up.  
CMS = Close medium shot = MCS = Medium close shot =  
between Medium shot and Full shot.  
CU = Close-up.  
FS = Full shot.  
LS = Long shot.  
MCU = Medium close-up = between Close medium shot and  
Close-up.  
MLS = Medium long shot = FS = Full shot.  
MS = Medium shot.

### Staging Effects

Film-making offers great scope for the use of one's powers of imagination, for with the camera anything is possible.

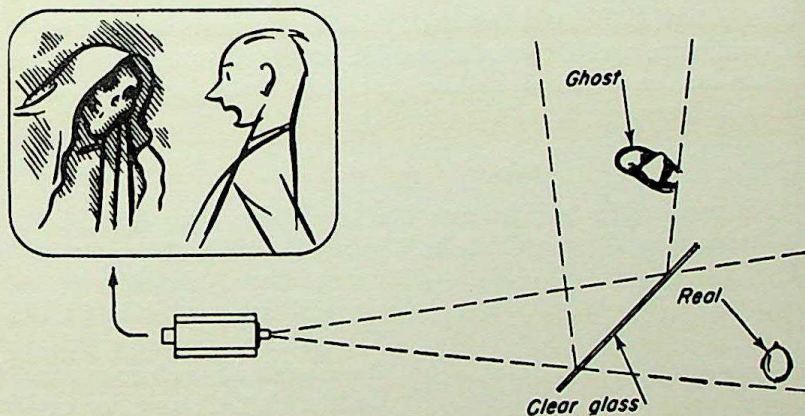


Fig. 2. The "Pepper's Ghost" illusion.

Reflection of this nature is accompanied by considerable light loss, and so the "ghost" must be sufficiently illuminated to achieve the necessary balance.

The mirror is placed at 45° to the camera axis and the reflected subject can be wiped-in by moving the camera or mirror as shown



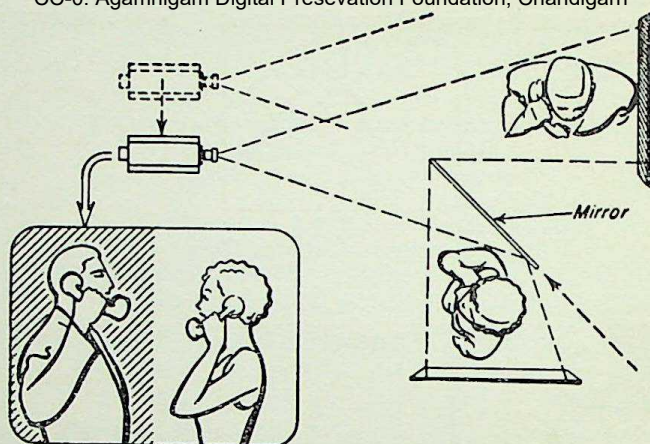


Fig. 3. A split screen effect with a mirror.

by the dotted lines and arrows. Smooth movement is essential to a good wipe, and if this is impossible on the floor, then the same effect can be obtained on the laboratory optical printer, given directly shot negatives of the separate subjects.

### Masks and Special Effects

A camera matte box protects the lens from stray light, holds diffusing discs, filters and masks. The masks in Fig. 4 are for split screen effects. The film is first exposed with a mask in the slot "S" and it is then reversed, the film re-wound and re-exposed. With mask "A", a person could walk across the frame and disappear at the centre, or change in any way required. Mask "B" gives similar scope, and "C" is useful for the effect of Fig. 3.

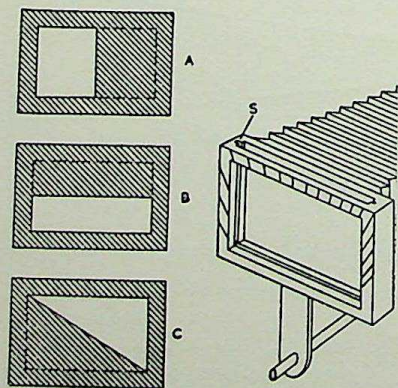
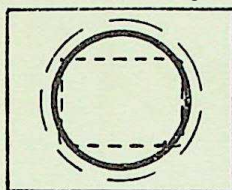
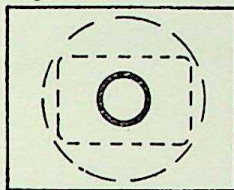


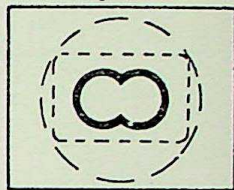
Fig. 4. A simple 16 mm. camera matte box and three inserts.



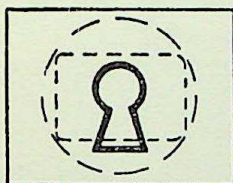
(a) *Fringing corners.*



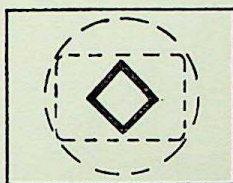
(b) *Telescope.*



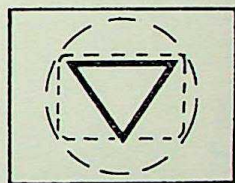
(c) *Binocular.*



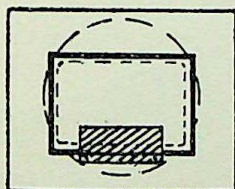
(d) *Keyhole.*



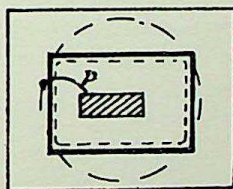
(e) *Diamond.*



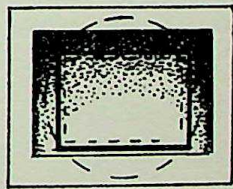
(f) *Triangle.*



(g) *To leave blank space for title lettering.*



(h) *As (g) but in frame centre with prop P placed to be "lost" in dark area of picture.*



(i) *Printing vignette stuck over open mask for merging of sky into darkness.*

Fig. 5. Camera masks.

Animation of inanimate material is normally obtained in cinematography by stop-frame techniques. However, continuous movement is possible with charts and titling if shutters are incorporated as shown in Figures 7, 8 and 9. An essential to good presentation in every case is that the shutter should be removed or replaced in a single smooth and regular movement.



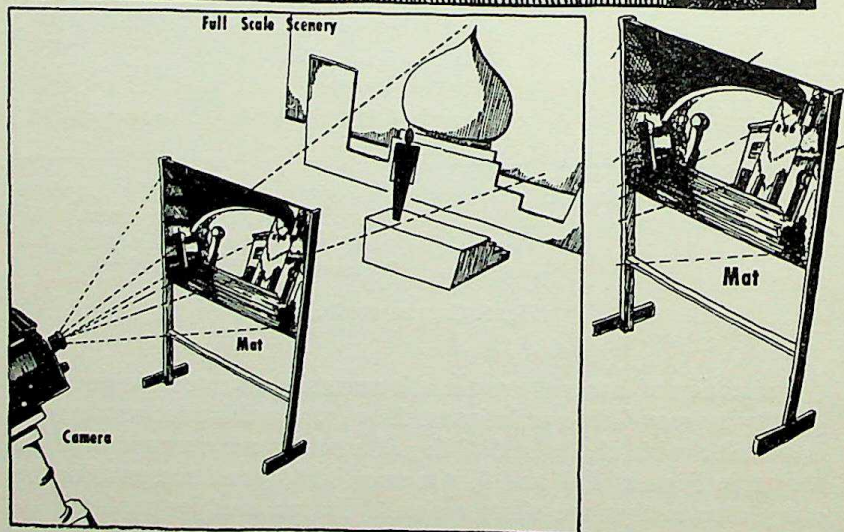
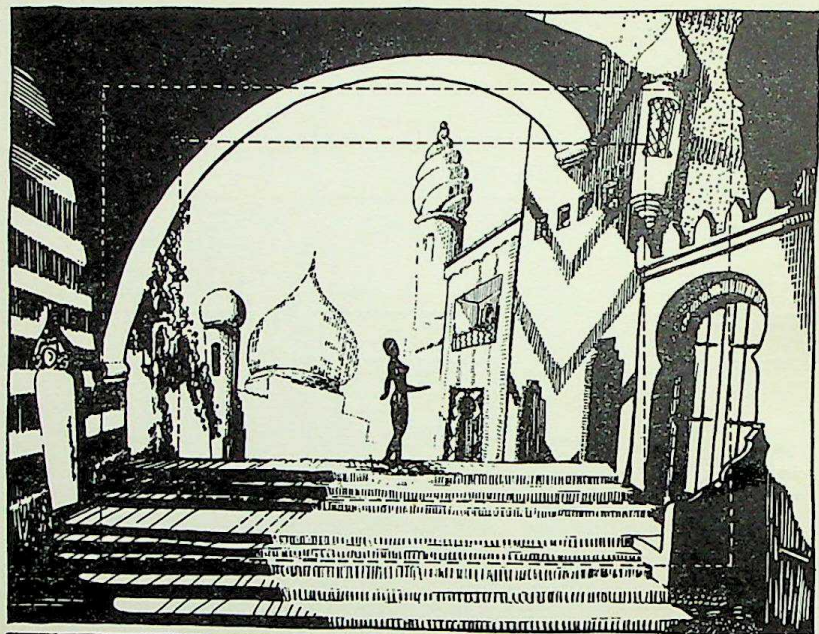


Fig. 6. A television type matte shot.

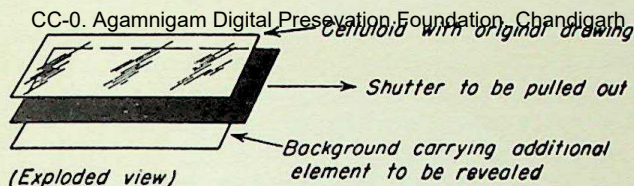


Fig. 7. The "popping-in" of information by the extraction of a shutter.

In Fig. 7, the main material is on a sheet of cellulose acetate and additional information on an opaque card placed beneath it. The two are separated by a black card, and when this is removed, both

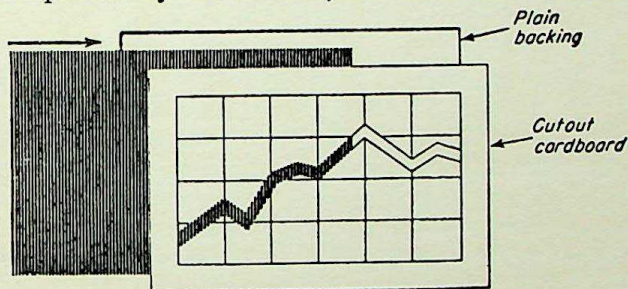


Fig. 8.—The addition of information by the insertion of a shutter.

the original drawing and the background are revealed to the camera. If the shutter is removed too quickly, then the background appears to "pop-in" after a fractional blurred movement.

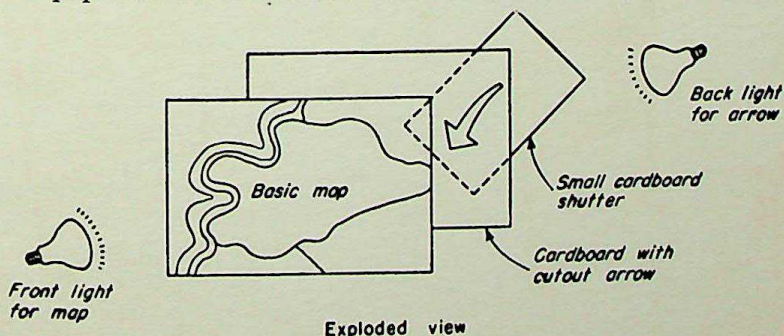


Fig. 9. The wiping-in of a rear lighted arrow by extracting a shutter.



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In Fig. 8, the background is identical in shade and texture with the front cut-out and so the graph line is not visible until the differently coloured or shaded shutter is inserted. If a dark background is used, then the cut-out can be made to show as a shutter matching the cut-out is withdrawn.

The method of Fig. 9 is that the basic material is provided on thin paper, with the background obscured by a card. A strong backlight shines through when the shutter is removed and so superimposes the cut-out shape in white on the basic material.

## 2

## COLOUR IN FILMING

THE THREE MAIN attributes of colour are its hue, purity and brightness.

Hue is that respect in which a colour differs from a grey of the same brilliance and which enables it to be termed red, green, blue, etc. The name given to any colour is that of its dominant reflected or transmitted light wavelength, and this is the wavelength the hue of which matches that of the colour being measured.

A pure colour is said to be saturated, and full hues of this nature are not, in the strictest sense, normally used in scenery paints and fabric dyes. Colour saturation is the degree of freedom of a colour from admixture of white, and chroma the degree of freedom from black. A tint is made by mixing white with a colour, and a shade by adding black.

Artists use the word "value" and this is the brightness obtained when a colour is mixed with other colours, black or white. Intensity in the colour sense is the degree of purity of the sample in question, whilst brightness or luminosity is always termed value. Thus, blue with white is of high value, blue with red (violet) is of low value, but both are low intensity blues.

Reddish colours are said to be "warm" in appearance and blue-greens "cool". These conceptions are psychological in nature and are related to the fact that fire is red and many cool things in nature are blue and green. Actually, the psychology of colour is very involved and many film-makers have already experimented in combining abstract colour shapes in order to inspire certain emotions.

Fig. 10 is a chromatic circle, and shows complementary colours placed opposite one another. The effect of mixing the light of two such colours is to produce white or grey, and the combination of complementary dyes or pigments makes greys.

Another feature of the chromatic circle is that if any two colours



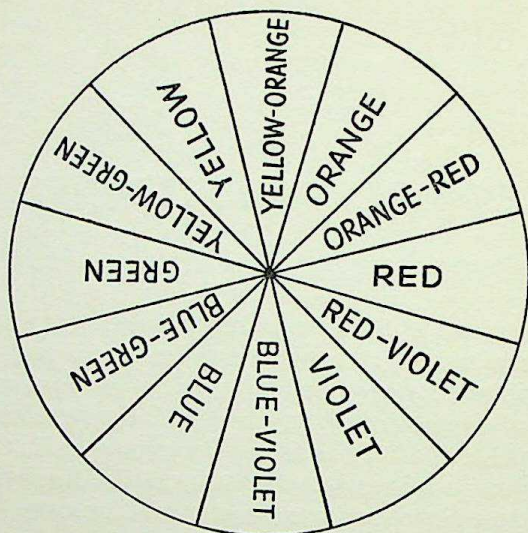


Fig. 10. A chromatic circle.

shown on it are mixed, the resultant is named intermediate between them. Thus, yellow + blue = green, and red + yellow = orange.

When a filter of any colour on the circle is used with panchromatic film, the effect is to lighten its own colour and darken its complementary. Similarly, the colours most distant from the filter colour are darkened and those nearer are lightened.

### The Colour Chart

Batches of colour film may vary in their reproduction characteristics, and you will wish to experiment with different colours of light. Again, you will want to know the ways in which different colours appear on monochrome film and the precise effects of filters.

To assist film-makers, the author produced the *Sharps' Colour Chart and Grey Scale*, published by Fountain Press at 19s. 6d. This consists of thirty-two colours and a ten-step grey scale, with a table showing the colour response on test of a wide range of ciné films. The colours are part of the internationally standard Wilson Spectrum with some associated shades and tints and the way to test any type of film or colour combination is fully explained.

### 3

## GENERAL DATA

Film is one of the most exciting and challenging of creative art forms, for it gives both substance and permanent life to all that exists in reality or imagination. The passing moment is snatched from time to become fixed and ageless in the future and the airy nothingness of dreams is given the material flesh of our waking world.

However, technical skill is required to translate the idea into a visible form and, whilst all things mechanical must be subordinate to creation, perfection can only be obtained by a thorough understanding of the techniques of the medium. Because of this, the cinematographer must absorb the technical until it becomes a part of him and observance of its rules as little consciously heeded as breathing.

In this volume many things of technical concern have been described and there follows in this section some tables provided to save time and worry in operating the camera. The conversion table for speed numbers enables any exposure meter to be aligned quickly with any type of film regardless of its quoted speed. The frame footage calculator helps in those calculations that are an inevitable grind if titling, cartoon or puppet animation is attempted. The other tables relate length of film to time of exposure or projection and provide a ready means of ascertaining the desirable length of shots, or the amount of film required for a forty minute show.

A notable omission from a book on cinematography is depth of field tables. This was quite deliberate and the reasoning behind the decision was that (a) many cameras now have the tables inscribed on their lens barrels, (b) more reflex finder cameras are in use, and, (c) if you want these tables, then the pocket calculator discs are both more convenient to carry and more likely to stand repeated handling on location than pages in this book.



## CONVERSION TABLE FOR SPEED NUMBERS

| <i>B.S.I. Log<br/>Exposure<br/>Table</i> | <i>A.S.A. &amp;<br/>B.S.I.<br/>Exposure<br/>Table</i> | <i>H. &amp; D.<br/>British</i> | <i>D.I.N.</i> | <i>American<br/>Scheiner</i> | <i>European<br/>Scheiner</i> | <i>Weston</i> |
|------------------------------------------|-------------------------------------------------------|--------------------------------|---------------|------------------------------|------------------------------|---------------|
| 10°                                      | 0.8                                                   | 25                             | 1/10          | 5°                           | 11°                          | 0.5           |
| 11°                                      | 1.0                                                   | 31                             | 2/10          | 6°                           | 12°                          | 0.62          |
| 12°                                      | 1.2                                                   | 37                             | 3/10          | 7°                           | 13°                          | 0.75          |
| 13°                                      | 1.6                                                   | 50                             | 4/10          | 8°                           | 14°                          | 1             |
| 14°                                      | 2.0                                                   | 62                             | 5/10          | 9°                           | 15°                          | 1.25          |
| 15°                                      | 2.5                                                   | 78                             | 6/10          | 10°                          | 16°                          | 1.5           |
| 16°                                      | 3                                                     | 100                            | 7/10          | 11°                          | 17°                          | 2             |
| 17°                                      | 4                                                     | 125                            | 8/10          | 12°                          | 18°                          | 2.5           |
| 18°                                      | 5                                                     | 150                            | 9/10          | 13°                          | 19°                          | 3             |
| 19°                                      | 6                                                     | 200                            | 10/10         | 14°                          | 20°                          | 4             |
| 20°                                      | 8                                                     | 250                            | 11/10         | 15°                          | 21°                          | 5             |
| 21°                                      | 10                                                    | 300                            | 12/10         | 16°                          | 22°                          | 6             |
| 22°                                      | 12                                                    | 400                            | 13/10         | 17°                          | 23°                          | 8             |
| 23°                                      | 16                                                    | 500                            | 14/10         | 18°                          | 24°                          | 10            |
| 24°                                      | 20                                                    | 600                            | 15/10         | 19°                          | 25°                          | 12            |
| 25°                                      | 25                                                    | 800                            | 16/10         | 20°                          | 26°                          | 16            |
| 26°                                      | 32                                                    | 1,000                          | 17/10         | 21°                          | 27°                          | 20            |
| 27°                                      | 40                                                    | 1,200                          | 18/10         | 22°                          | 28°                          | 24            |
| 28°                                      | 50                                                    | 1,600                          | 19/10         | 23°                          | 29°                          | 32            |
| 29°                                      | 64                                                    | 2,000                          | 20/10         | 24°                          | 30°                          | 40            |
| 30°                                      | 80                                                    | 2,400                          | 21/10         | 25°                          | 31°                          | 48            |
| 31°                                      | 100                                                   | 3,200                          | 22/10         | 26°                          | 32°                          | 64            |
| 32°                                      | 125                                                   | 4,000                          | 23/10         | 27°                          | 33°                          | 80            |
| 33°                                      | 160                                                   | 4,800                          | 24/10         | 28°                          | 34°                          | 96            |
| 34°                                      | 200                                                   | 6,400                          | 25/10         | 29°                          | 35°                          | 128           |
| 35°                                      | 250                                                   | 8,000                          | 26/10         | 30°                          | 36°                          | 160           |
| 36°                                      | 300                                                   | 9,600                          | 27/10         | 31°                          | 37°                          | 200           |
| 37°                                      | 400                                                   | 12,800                         | 28/10         | 32°                          | 38°                          | 250           |
| 38°                                      | 500                                                   | 16,000                         | 29/10         | 33°                          | 39°                          | 300           |
| 39°                                      | 600                                                   | 20,000                         | 30/10         | 34°                          | 40°                          | 400           |
| 40°                                      | 800                                                   | 25,000                         | 31/10         | 35°                          | 41°                          | 500           |
| 41°                                      | 1,000                                                 | 30,000                         | 32/10         | 36°                          | 42°                          | 600           |

The figures quoted here are approximate only and are intended as a rough guide to users of exposure meters scaled in the various units.

Fig. 11.

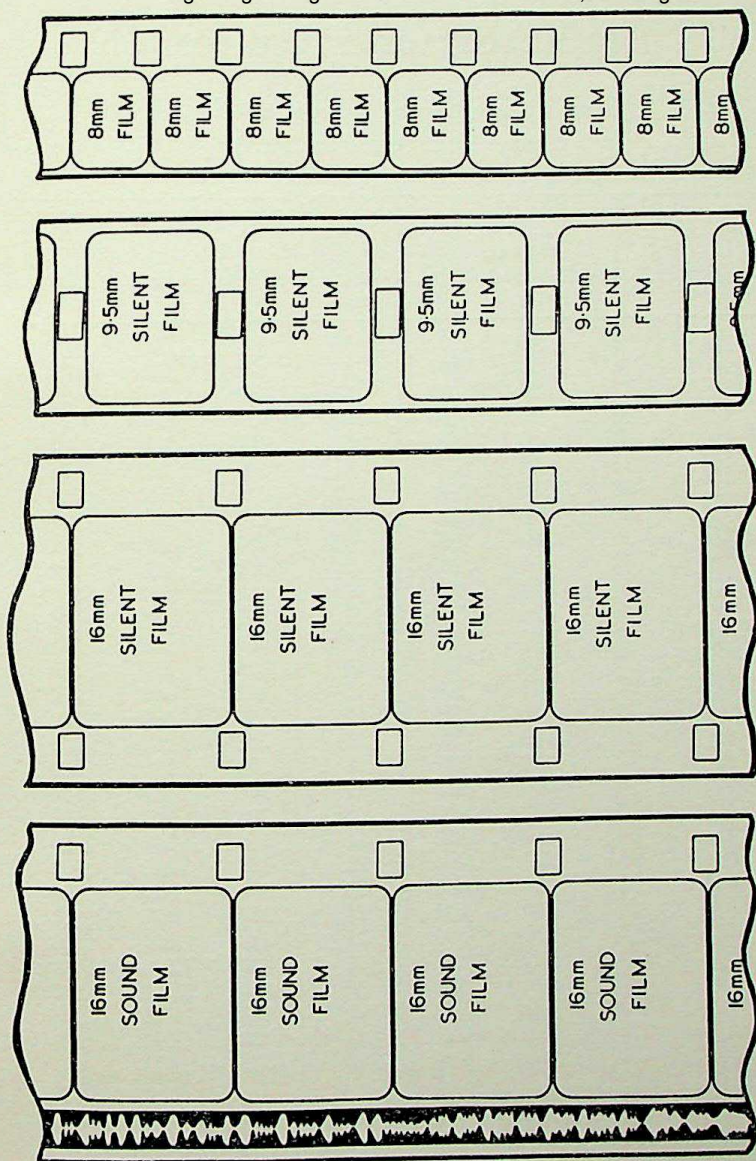


Fig. 12. Narrow-gauge film dimensions



# FRAME/FOOTAGE CALCULATOR

Number of Frames Exposed or Projected in varying  
Footage Totals (Sound and Silent)

| Feet           | 16 mm. |         |       | Feet           | 16 mm. |         |       |
|----------------|--------|---------|-------|----------------|--------|---------|-------|
|                | 35 mm. | 9.5 mm. | 8 mm. |                | 35 mm. | 9.5 mm. | 8 mm. |
| $\frac{1}{4}$  | 4      | 10      | 20    | $7\frac{3}{4}$ | 124    | 310     | 620   |
| $\frac{1}{2}$  | 8      | 20      | 40    | 8              | 128    | 320     | 640   |
| $\frac{3}{4}$  | 12     | 30      | 60    | $8\frac{1}{4}$ | 132    | 330     | 660   |
| 1              | 16     | 40      | 80    | $8\frac{1}{2}$ | 136    | 340     | 680   |
| $1\frac{1}{4}$ | 20     | 50      | 100   | $8\frac{3}{4}$ | 140    | 350     | 700   |
| $1\frac{1}{2}$ | 24     | 60      | 120   | 9              | 144    | 360     | 720   |
| $1\frac{3}{4}$ | 28     | 70      | 140   | $9\frac{1}{4}$ | 148    | 370     | 740   |
| 2              | 32     | 80      | 160   | $9\frac{1}{2}$ | 152    | 380     | 760   |
| $2\frac{1}{4}$ | 36     | 90      | 180   | $9\frac{3}{4}$ | 156    | 390     | 780   |
| $2\frac{1}{2}$ | 40     | 100     | 200   | 10             | 160    | 400     | 800   |
| $2\frac{3}{4}$ | 44     | 110     | 220   | 11             | 176    | 440     | 880   |
| 3              | 48     | 120     | 240   | 12             | 192    | 480     | 960   |
| $3\frac{1}{4}$ | 52     | 130     | 260   | 13             | 208    | 520     | 1,040 |
| $3\frac{1}{2}$ | 56     | 140     | 280   | 14             | 224    | 560     | 1,120 |
| $3\frac{3}{4}$ | 60     | 150     | 300   | 15             | 240    | 600     | 1,200 |
| 4              | 64     | 160     | 320   | 16             | 256    | 640     | 1,280 |
| $4\frac{1}{4}$ | 68     | 170     | 340   | 17             | 272    | 680     | 1,360 |
| $4\frac{1}{2}$ | 72     | 180     | 360   | 18             | 288    | 720     | 1,440 |
| $4\frac{3}{4}$ | 76     | 190     | 380   | 19             | 304    | 760     | 1,520 |
| 5              | 80     | 200     | 400   | 20             | 320    | 800     | 1,600 |
| $5\frac{1}{4}$ | 84     | 210     | 420   | 21             | 336    | 840     | 1,680 |
| $5\frac{1}{2}$ | 88     | 220     | 440   | 22             | 352    | 880     | 1,760 |
| $5\frac{3}{4}$ | 92     | 230     | 460   | 23             | 368    | 920     | 1,840 |
| 6              | 96     | 240     | 480   | 24             | 384    | 960     | 1,920 |
| $6\frac{1}{4}$ | 100    | 250     | 500   | 25             | 400    | 1,000   | 2,000 |
| $6\frac{1}{2}$ | 104    | 260     | 520   | 30             | 480    | 1,200   | 2,400 |
| $6\frac{3}{4}$ | 108    | 270     | 540   | 35             | 560    | 1,400   | 2,800 |
| 7              | 112    | 280     | 560   | 40             | 640    | 1,600   | 3,200 |
| $7\frac{1}{4}$ | 116    | 290     | 580   | 45             | 720    | 1,800   | 3,600 |
| $7\frac{1}{2}$ | 120    | 300     | 600   | 50             | 800    | 2,000   | 4,000 |

Fig. 13.

**FRAME/TIME CALCULATOR**

**Number of Frames Exposed or Projected in varying times. Identical  
for 35 mm., 16 mm., 9.5 mm., and 8 mm. film**

| <i>Seconds</i> | <i>Sound<br/>Speed</i> | <i>Silent<br/>Speed</i> | <i>Seconds</i> | <i>Sound<br/>Speed</i> | <i>Silent<br/>Speed</i> |
|----------------|------------------------|-------------------------|----------------|------------------------|-------------------------|
| 1              | 24                     | 16                      | 31             | 744                    | 496                     |
| 2              | 48                     | 32                      | 32             | 768                    | 512                     |
| 3              | 72                     | 48                      | 33             | 792                    | 528                     |
| 4              | 96                     | 64                      | 34             | 816                    | 544                     |
| 5              | 120                    | 80                      | 35             | 840                    | 560                     |
| 6              | 144                    | 96                      | 36             | 864                    | 576                     |
| 7              | 168                    | 112                     | 37             | 888                    | 592                     |
| 8              | 192                    | 128                     | 38             | 912                    | 608                     |
| 9              | 216                    | 144                     | 39             | 936                    | 624                     |
| 10             | 240                    | 160                     | 40             | 960                    | 640                     |
| 11             | 264                    | 176                     | 41             | 984                    | 656                     |
| 12             | 288                    | 192                     | 42             | 1,008                  | 672                     |
| 13             | 312                    | 208                     | 43             | 1,032                  | 688                     |
| 14             | 336                    | 224                     | 44             | 1,056                  | 704                     |
| 15             | 360                    | 240                     | 45             | 1,080                  | 720                     |
| 16             | 384                    | 256                     | 46             | 1,104                  | 736                     |
| 17             | 408                    | 272                     | 47             | 1,128                  | 752                     |
| 18             | 432                    | 288                     | 48             | 1,152                  | 768                     |
| 19             | 456                    | 304                     | 49             | 1,176                  | 784                     |
| 20             | 480                    | 320                     | 50             | 1,200                  | 800                     |
| 21             | 504                    | 336                     | 51             | 1,224                  | 816                     |
| 22             | 528                    | 352                     | 52             | 1,248                  | 832                     |
| 23             | 552                    | 368                     | 53             | 1,272                  | 848                     |
| 24             | 576                    | 384                     | 54             | 1,296                  | 864                     |
| 25             | 600                    | 400                     | 55             | 1,320                  | 880                     |
| 26             | 624                    | 416                     | 56             | 1,344                  | 896                     |
| 27             | 648                    | 432                     | 57             | 1,368                  | 912                     |
| 28             | 672                    | 448                     | 58             | 1,392                  | 928                     |
| 29             | 696                    | 464                     | 59             | 1,416                  | 944                     |
| 30             | 720                    | 480                     | 60             | 1,440                  | 960                     |

Fig. 14.



## TIME/FOOTAGE CALCULATOR

## Cameras and Projectors—Standard Speeds

| <i>Mins.</i> | <i>Secs.</i> | 35 mm.       |               | 16 mm.        |               | 9.5 mm.       | 8 mm.         |
|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
|              |              | <i>Sound</i> | <i>Silent</i> | <i>Sound</i>  | <i>Silent</i> | <i>Silent</i> | <i>Silent</i> |
|              |              | <i>ft.</i>   | <i>ft.</i>    | <i>ft.</i>    | <i>ft.</i>    | <i>ft.</i>    | <i>ft.</i>    |
|              | 1            | 1½           | 1             | $\frac{3}{8}$ | $\frac{2}{5}$ | $\frac{2}{5}$ | $\frac{1}{5}$ |
|              | 2            | 3            | 2             | 1½            | $\frac{4}{5}$ | $\frac{4}{5}$ | $\frac{2}{5}$ |
|              | 3            | 4½           | 3             | 1½            | 1½            | 1½            | $\frac{3}{5}$ |
|              | 4            | 6            | 4             | 2½            | 1½            | 1½            | $\frac{4}{5}$ |
|              | 5            | 7½           | 5             | 3             | 2             | 2             | 1             |
|              | 6            | 9            | 6             | 3½            | 2½            | 2½            | 1½            |
|              | 7            | 10½          | 7             | 4½            | 2½            | 2½            | 1½            |
|              | 8            | 12           | 8             | 4½            | 3½            | 3½            | 1½            |
|              | 9            | 13½          | 9             | 5½            | 3½            | 3½            | 1½            |
|              | 10           | 15           | 10            | 6             | 4             | 4             | 2             |
|              | 15           | 22½          | 15            | 9             | 6             | 6             | 3             |
|              | 20           | 30           | 20            | 12            | 8             | 8             | 4             |
|              | 25           | 37½          | 25            | 15            | 10            | 10            | 5             |
|              | 30           | 45           | 30            | 18            | 12            | 12            | 6             |
|              | 35           | 52½          | 35            | 21            | 14            | 14            | 7             |
|              | 40           | 60           | 40            | 24            | 16            | 16            | 8             |
|              | 45           | 67½          | 45            | 27            | 18            | 18            | 9             |
|              | 50           | 75           | 50            | 30            | 20            | 20            | 10            |
|              | 55           | 82½          | 55            | 33            | 22            | 22            | 11            |
| 1            | —            | 90           | 60            | 36            | 24            | 24            | 12            |
| 2            | —            | 180          | 120           | 72            | 48            | 48            | 24            |
| 3            | —            | 270          | 180           | 108           | 72            | 72            | 36            |
| 4            | —            | 360          | 240           | 144           | 96            | 96            | 48            |
| 5            | —            | 450          | 300           | 180           | 120           | 120           | 60            |

Fig. 15.

**TIME/FOOTAGE CALCULATOR****Cameras and Projectors—Standard Speeds**

| <i>Hrs.</i> | <i>Mins.</i> | <i>35 mm.</i> |               | <i>16 mm.</i> |               | <i>9.5 mm.</i> | <i>8 mm.</i>  |
|-------------|--------------|---------------|---------------|---------------|---------------|----------------|---------------|
|             |              | <i>Sound</i>  | <i>Silent</i> | <i>Sound</i>  | <i>Silent</i> | <i>Silent</i>  | <i>Silent</i> |
|             |              | <i>ft.</i>    | <i>ft.</i>    | <i>ft.</i>    | <i>ft.</i>    | <i>ft.</i>     | <i>ft.</i>    |
|             | 6            | 540           | 360           | 216           | 144           | 144            | 72            |
|             | 7            | 630           | 420           | 252           | 168           | 168            | 84            |
|             | 8            | 720           | 480           | 288           | 192           | 192            | 96            |
|             | 9            | 810           | 540           | 324           | 216           | 216            | 108           |
|             | 10           | 900           | 600           | 360           | 240           | 240            | 120           |
|             | 15           | 1,350         | 900           | 540           | 360           | 360            | 180           |
|             | 20           | 1,800         | 1,200         | 720           | 480           | 480            | 240           |
|             | 25           | 2,250         | 1,500         | 900           | 600           | 600            | 300           |
|             | 30           | 2,700         | 1,800         | 1,080         | 720           | 720            | 360           |
|             | 35           | 3,150         | 2,100         | 1,260         | 840           | 840            | 420           |
|             | 40           | 3,600         | 2,400         | 1,440         | 960           | 960            | 480           |
|             | 45           | 4,050         | 2,700         | 1,620         | 1,080         | 1,080          | 540           |
|             | 50           | 4,500         | 3,000         | 1,800         | 1,200         | 1,200          | 600           |
|             | 55           | 4,950         | 3,300         | 1,980         | 1,320         | 1,320          | 660           |
| 1           | —            | 5,400         | 3,600         | 2,160         | 1,440         | 1,440          | 720           |
| 1           | 10           | 6,300         | 4,200         | 2,520         | 1,680         | 1,680          | 840           |
| 1           | 20           | 7,200         | 4,800         | 2,880         | 1,920         | 1,920          | 860           |
| 1           | 30           | 8,100         | 5,400         | 3,240         | 2,160         | 2,160          | 1,080         |
| 1           | 40           | 9,000         | 6,000         | 3,600         | 2,400         | 2,400          | 1,200         |
| 1           | 50           | 9,900         | 6,600         | 3,960         | 2,640         | 2,640          | 1,320         |
| 2           | —            | 10,800        | 7,200         | 4,320         | 2,880         | 2,880          | 1,440         |
| 2           | 10           | 11,700        | 7,800         | 4,680         | 3,120         | 3,120          | 1,560         |
| 2           | 20           | 12,600        | 8,400         | 5,040         | 3,360         | 3,360          | 1,680         |
| 2           | 30           | 13,500        | 9,000         | 5,400         | 3,600         | 3,600          | 1,800         |

Fig. 16.



# FOOTAGE/TIME CALCULATOR

## Cameras and Projectors—Standard Speeds

|      | 35 mm.          |           | 16 mm.          |                 | 9.5 mm.         |                 | 8 mm.           |                 |                 |    |    |
|------|-----------------|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----|----|
| Feet | Sound           | Silent    | Sound           | Silent          | Silent          | Silent          | Silent          | Silent          |                 |    |    |
|      | min. sec.       | min. sec. | min. sec.       | min. sec.       | min. sec.       | min. sec.       | min. sec.       | min. sec.       |                 |    |    |
| 1    | $\frac{2}{3}$   | 1         | $1\frac{2}{3}$  | $2\frac{1}{2}$  | $2\frac{1}{2}$  |                 |                 | 5               |                 |    |    |
| 2    | $1\frac{1}{3}$  | 2         | $3\frac{1}{3}$  | 5               | 5               |                 |                 | 10              |                 |    |    |
| 3    | 2               | 3         | 5               | $7\frac{1}{2}$  | $7\frac{1}{2}$  |                 |                 | 15              |                 |    |    |
| 4    | $2\frac{2}{3}$  | 4         | $6\frac{2}{3}$  | 10              | 10              |                 |                 | 20              |                 |    |    |
| 5    | $3\frac{1}{3}$  | 5         | $8\frac{1}{3}$  | $12\frac{1}{2}$ | $12\frac{1}{2}$ |                 |                 | 25              |                 |    |    |
| 6    | 4               | 6         | 10              | 15              | 15              |                 |                 | 30              |                 |    |    |
| 7    | $4\frac{2}{3}$  | 7         | $11\frac{2}{3}$ | $17\frac{1}{2}$ | $17\frac{1}{2}$ |                 |                 | 35              |                 |    |    |
| 8    | $5\frac{1}{3}$  | 8         | $13\frac{1}{3}$ | 20              | 20              |                 |                 | 40              |                 |    |    |
| 9    | 6               | 9         | 15              | $22\frac{1}{2}$ | $22\frac{1}{2}$ |                 |                 | 45              |                 |    |    |
| 10   | $6\frac{2}{3}$  | 10        | $16\frac{2}{3}$ | 25              | 25              |                 |                 | 50              |                 |    |    |
| 12   | 8               | 12        | 20              | 30              | 30              | 1               | —               |                 |                 |    |    |
| 15   | 10              | 15        | 25              | $37\frac{1}{2}$ | $37\frac{1}{2}$ | 1               | 15              |                 |                 |    |    |
| 20   | $13\frac{1}{3}$ | 20        | $33\frac{1}{3}$ | 50              | 50              | 1               | 40              |                 |                 |    |    |
| 25   | $16\frac{2}{3}$ | 25        | $41\frac{2}{3}$ | 1               | $21\frac{1}{2}$ | 1               | $21\frac{1}{2}$ | 2               | 5               |    |    |
| 30   | 20              | 30        | 50              | 1               | 15              | 1               | 15              | 2               | 30              |    |    |
| 35   | $23\frac{1}{3}$ | 35        | $58\frac{1}{3}$ | 1               | $27\frac{1}{2}$ | 1               | $27\frac{1}{2}$ | 2               | 55              |    |    |
| 40   | $26\frac{2}{3}$ | 40        | 1               | $6\frac{2}{3}$  | 1               | 40              | 1               | 40              | 3               | 20 |    |
| 45   | 30              | 45        | 1               | 15              | 1               | $52\frac{1}{2}$ | 1               | $52\frac{1}{2}$ | 3               | 45 |    |
| 50   | $33\frac{1}{3}$ | 50        | 1               | $23\frac{1}{3}$ | 2               | 5               | 2               | 5               | 4               | 10 |    |
| 55   | $36\frac{2}{3}$ | 55        | 1               | $31\frac{2}{3}$ | 2               | $17\frac{1}{2}$ | 2               | $17\frac{1}{2}$ | 4               | 35 |    |
| 60   | 40              | 1         | —               | 1               | 40              | 2               | 30              | 2               | 30              | 5  | —  |
| 65   | $43\frac{1}{3}$ | 1         | 5               | 1               | $48\frac{1}{3}$ | 2               | $42\frac{1}{2}$ | 2               | $42\frac{1}{2}$ | 5  | 25 |
| 70   | $46\frac{2}{3}$ | 1         | 10              | 1               | $56\frac{2}{3}$ | 2               | 55              | 2               | 55              | 5  | 50 |

Fig. 17.

# FOOTAGE/TIME CALCULATOR

## Cameras and Projectors—Standard Speeds

| Feet  | 35 mm. |      |        |      | 16 mm. |      |        |      | 9.5 mm. |      | 8 mm.  |      |
|-------|--------|------|--------|------|--------|------|--------|------|---------|------|--------|------|
|       | Sound  |      | Silent |      | Sound  |      | Silent |      | Silent  |      | Silent |      |
|       | min.   | sec. | min.   | sec. | min.   | sec. | min.   | sec. | min.    | sec. | min.   | sec. |
| 75    |        | 50   | 1      | 15   | 2      | 5    | 3      | 7½   | 3       | 7½   | 6      | 15   |
| 80    |        | 53½  | 1      | 20   | 2      | 13½  | 3      | 20   | 3       | 20   | 6      | 40   |
| 85    |        | 56¾  | 1      | 25   | 2      | 21¾  | 3      | 32½  | 3       | 32½  | 7      | 5    |
| 90    | 1      | —    | 1      | 30   | 2      | 30   | 3      | 45   | 3       | 45   | 7      | 30   |
| 95    | 1      | 3½   | 1      | 35   | 2      | 38¾  | 3      | 57½  | 3       | 57½  | 7      | 55   |
| 100   | 1      | 6¾   | 1      | 40   | 2      | 46¾  | 4      | 10   | 4       | 10   | 8      | 20   |
| 150   | 1      | 40   | 2      | 30   | 4      | 10   | 6      | 15   | 6       | 15   | 12     | 30   |
| 200   | 2      | 13½  | 3      | 20   | 5      | 33   | 8      | 20   | 8       | 20   | 16     | 40   |
| 250   | 2      | 46¾  | 4      | 10   | 6      | 57   | 10     | 25   | 10      | 25   | 20     | 50   |
| 300   | 3      | 20   | 5      | —    | 8      | 20   | 12     | 30   | 12      | 30   | 25     | —    |
| 350   | 3      | 53½  | 5      | 50   | 9      | 43   | 14     | 35   | 14      | 35   | 29     | 10   |
| 400   | 4      | 26¾  | 6      | 40   | 11     | 6    | 16     | 40   | 16      | 40   | 33     | 20   |
| 450   | 5      | —    | 7      | 30   | 12     | 30   | 18     | 45   | 18      | 45   | 37     | 30   |
| 500   | 5      | 33   | 8      | 20   | 13     | 54   | 20     | 50   | 20      | 50   | 41     | 40   |
| 550   | 6      | 6    | 9      | 10   | 15     | 37   | 22     | 55   | 22      | 55   | 45     | 50   |
| 600   | 6      | 40   | 10     | —    | 16     | 40   | 25     | —    | 25      | —    | 50     | —    |
| 650   | 7      | 13   | 10     | 50   | 18     | 3    | 27     | 5    | 27      | 5    | 54     | 10   |
| 700   | 7      | 46   | 11     | 40   | 19     | 26   | 29     | 10   | 29      | 10   | 58     | 20   |
| 750   | 8      | 20   | 12     | 30   | 20     | 49   | 31     | 15   | 31      | 15   | 62     | 30   |
| 800   | 8      | 53   | 13     | 20   | 22     | 12   | 33     | 20   | 33      | 20   | 66     | 40   |
| 850   | 9      | 26   | 14     | 10   | 23     | 36   | 35     | 25   | 35      | 25   | 70     | 50   |
| 900   | 10     | —    | 15     | —    | 25     | —    | 37     | 30   | 37      | 30   | 75     | —    |
| 950   | 10     | 33   | 15     | 50   | 26     | 24   | 39     | 35   | 39      | 35   | 79     | 10   |
| 1,000 | 11     | 6    | 16     | 40   | 27     | 48   | 41     | 40   | 41      | 40   | 83     | 20   |

Fig. 18.



## 4

## THE CAMERA EYE

A LENS is a transparent medium, usually glass, bounded by two surfaces, generally curved.

This broad description covers all lenses used for the collection, transmission and focusing of light rays. These range from those in giant telescopes to humble projector condensers and includes our especial interest, the camera lens. However, there are certain factors common to all lenses and in particular that they can be described in general terms by the two variables of focal length and maximum aperture.

## Focal Length

When rays of light parallel to the optical axis enter a camera lens, they are converged by the lens system and come to focus at a point known as the "principal focus". This latter point is designated by the letter "F" in Fig. 19. This figure also shows the focal length of the

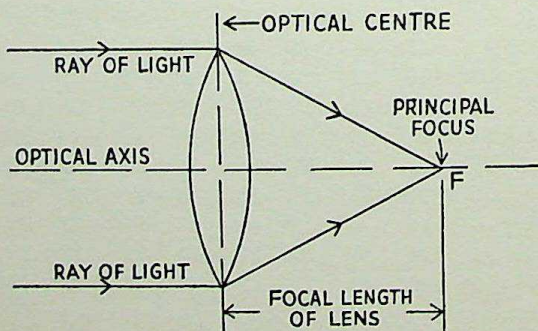


Fig. 19.

lens as the distance between the principal focus and a point on the optical axis described as the "optical centre". Now the optical centre has no practical significance, but it is a common method of assisting the diagrammatic representation of optical phenomena.

The optical centre is really an imaginary combination of the two nodal points of a lens and each nodal point is found by measuring back along the optical axis a distance equal to the focal length from the principal focus. If after one such measurement the lens is turned around and the experiment repeated, the second nodal point is

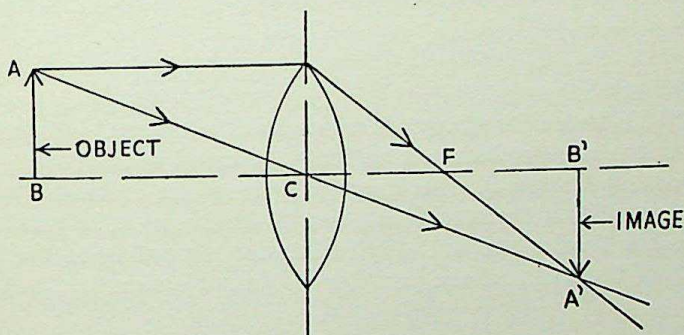


Fig. 20.

found, and that relating to the object side of the lens is termed the "forward nodal point", the other being the "rear nodal point".

The properties of the nodal points are that:

(1) any ray of light passing through one nodal point, will emerge from the lens as if it came from the other nodal point and will be unchanged in direction; and

(2) any ray meeting a plane perpendicular to the optical axis through a nodal point (that is, a principal or nodal plane) emerges from the lens as if coming from a point on the other principal or nodal plane at an equal distance above the optical axis.

Thus, for all practical purposes, the nodal points behave as one, and are shown diagrammatically in this manner. Fig. 20 illustrates how by the application of the above information, the size and position of the image of an object may be determined. The combined nodal points are shown as "C" in the diagram.



The focal length of a lens is normally measured in millimetres or inches and the figure is engraved on the lens mount, preceded by the capital letter F. A simple method of determining the focal length of an unmarked lens is to direct it at the sun and to move it backwards and forwards relative to a sheet of paper. When a small hard bright image of the sun is observed upon the paper, then it is at the principal focus of the lens. The measurement of focal length in this way is only approximate, but it is sufficiently accurate for emergency use.

The lenses shown in Figs. 19 and 20 are simple in nature, but those for film cameras normally have a number of separate glasses held within a long metal barrel.

### Depth of Focus

Fig. 20 illustrated the manner in which an object placed in front of a simple lens is reproduced as an image reversed both laterally and horizontally behind it. The image forming plane is known as the "focal plane" and the sensitive surface of the film must be positioned there. The focal plane will vary in location according to the focal length of the lens and the position of the subject matter, and this

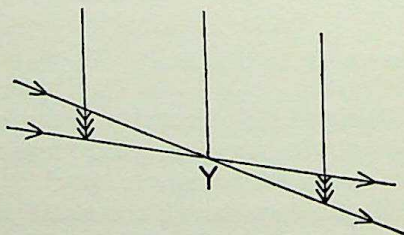


Fig. 21.

is the only plane in which the image is sharp. In order that the image may be kept sharp (in focus), the position of the image forming surface in the camera relative to the lens must be varied. This is accomplished by moving the lens and keeping the film static.

Fig. 21 shows that if the image forming surface in the camera is other than at the focal plane, every point (such as Y) will appear as a much larger circular patch of light, known as the "circle of confusion". The image is then said to be out of focus, but there is a small distance on either side of the focal plane in which an image can

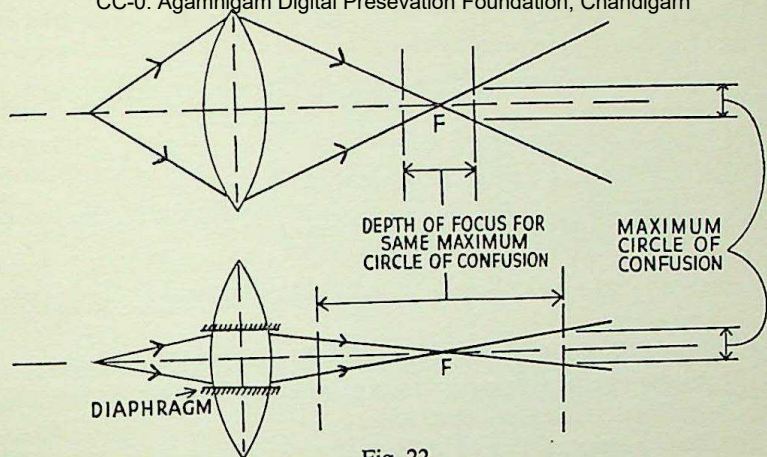


Fig. 22.

be cast without appearing to be too much out of focus to the viewers. This distance is called the “depth of focus” for a lens of stated focal length, aperture and maximum diameter of circle of confusion. Fig. 22 illustrates how for any given depth of focus, the maximum circle of confusion can be reduced in size by stopping down the lens. The importance of this lies in the fact that the depth of focus may be only a few thousandths of an inch, and this is easily accounted for by the slight misplacing of the focusing control, or the misalignment or thickness of the image forming sensitive surface. Thus, the reduction in the size of the circle of confusion is one reason why definition appears to improve when a lens is stopped down, the other reasons being concerned with the non-utilization of the edges of the lens where certain inherent optical faults become more apparent.

### Depth of Field

As there is a depth of focus on one side of a lens, there is a depth of field on the other, and this is the depth within which the subject may move without the limiting focal planes being outside the depth of focus limits of the lens as specified. As the distance between the lens and the subject is usually large by comparison with that between the lens and the focal plane, the depth of field is measured in inches and feet rather than the very small fractions of the depth of focus.



There are four variable factors in determining the depth of field at any instant. These are:

- (1) The distance setting of the lens (i.e. the point on which the lens is focused);
  - (2) The focal length of the lens.
  - (3) The effective aperture of the lens, and
  - (4) The permissible size of the circle of confusion at the image forming surface in the camera.
- 
- (1) As the distance setting is increased, the depth of field is increased.
  - (2) As the focal length increases, the depth of field decreases.
  - (3) As the aperture is increased (i.e. decreased in  $f$  or T number), the depth of field is decreased.
  - (4) As the permissible circle of confusion is increased, the depth of field is increased.

The practical effect of these variables is shown in Fig. 23.

---

| <i>Focal Length<br/>of Lens</i> | <i>Aperture</i> | <i>Distance<br/>Setting</i> | <i>Depth of Field (based on<br/>Maximum Circle of Confusion of<br/>0.001 inch per inch of<br/>Focal Length)</i> |
|---------------------------------|-----------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------|
| 3 in.                           | $f2$            | 10 feet                     | 9 ft. 3 in. to 10 ft. $10\frac{1}{2}$ in.                                                                       |
| 3 in.                           | $f8$            | 10 feet                     | 7 ft. 7 in. to 14 ft. $8\frac{1}{2}$ in.                                                                        |
| 3 in.                           | $f8$            | 25 feet                     | 13 ft. $10\frac{1}{2}$ in. to 125 ft.                                                                           |
| 6 in.                           | $f8$            | 25 feet                     | 17 ft. 10 in. to 41 ft. 8 in.                                                                                   |

---

Fig. 23.

### Perspective and Angle of View

Although the actual angle of view of any lens remains approximately constant under all circumstances, the angle of use is the important factor, and this is obviously dependent on the size of the image-forming surface in the camera. As the focal length of the lens in use is increased for any particular camera, so the effective angle of view decreases. This is clearly demonstrated by Fig. 24, which

| <i>Focal Length of Lens<br/>used at 10 ft. from<br/>Subject</i> | <i>Equivalent Angle of View to Lens of</i> |           |
|-----------------------------------------------------------------|--------------------------------------------|-----------|
|                                                                 | <i>Focal Length</i>                        | <i>at</i> |
| 2 in.                                                           | 2 in.                                      | 10 ft.    |
| 3 in.                                                           | 2 in.                                      | 80 in.    |
| 4 in.                                                           | 2 in.                                      | 60 in.    |
| 8 in.                                                           | 2 in.                                      | 30 in.    |
| 12 in.                                                          | 2 in.                                      | 20 in.    |

Fig. 24.

details the equivalent angles of view obtained by tracking a camera towards the subject, instead of keeping the camera steady and changing the lens.

When one looks up at a building, the fact that the verticals appear to converge is largely discounted by the brain. Similarly, when two objects of identical size but varying in distance from the camera are recorded, the nearer appears in a greatly enlarged form. This distortion is shown diagrammatically in Fig. 25, but we have all seen it in practice in photographs of people lying on the beach with their feet towards the camera.

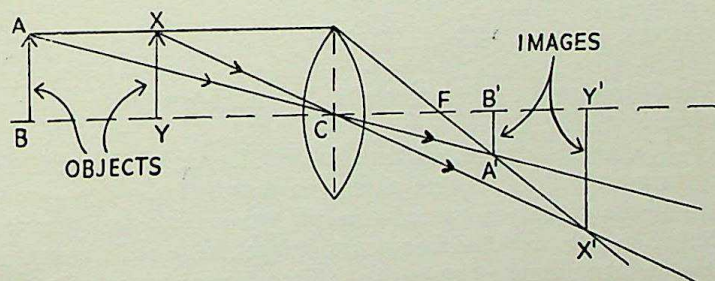


Fig. 25.

If the camera is moved towards the subject and the lens is changed to ensure that the foreground remains of constant image size, then more of the background will be included at each position and so will diminish in apparent size relative to the foreground. This is shown diagrammatically in Fig. 26.



Many of the so-called "camera distortions" are, in fact, nothing but true perspective records. Allowances have to be made in substituting lenses with their wide range of magnifying powers and angles of view for the less versatile human eye, but these can be defined quite simply. Once the rules that govern the operation of lenses have been learned, they can be applied to the imaging of reality to create a wide variety of effects.

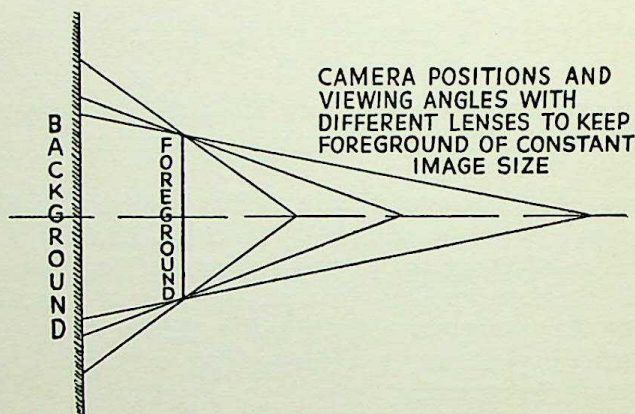


Fig. 26.

The following conclusions can be drawn from what has been said above:

(1) If the camera remains static and lenses of different focal lengths are used, there is no change in perspective.

(2) If the camera is moved towards the subject and the lens is changed in order that the foreground image shall be of constant size, then the foreground will appear to increase in size relative to the background. The reverse is also true.

(3) If the camera is moved towards the subject and the lens is unchanged, foreground matter will appear to appreciate rapidly in size relative to the background. The reverse is also true.

(4) If the camera is tilted towards the subject, the part nearest the camera is exaggerated in size. In reference to a building or other item of uniform construction, the effect is of converging verticals.

## Telephoto Lenses

The telephoto lens is basically composed of a positive section that converges rays of light, backed by a negative section causing them to diverge. Fig. 27 illustrates how this method produces an image identical to that of a conventional lens of longer back focus and larger overall dimensions. The back focus is the distance between the rear lens element and the focal plane and is equivalent to the focal length in a thin simple lens when focused on infinity.

The equivalent focal length of a telephoto lens is the focal length of a simple lens of the same magnifying power. The ratio of this equivalent focal length to the back focus of the telephoto gives what is known as its "power". For example: a lens of 20 in. equivalent focal length and a back focus of 10 in. has a power of 2 (or  $2\times$ ). Most telephoto lenses made today have powers of 2 to 3, and this permits of a high degree of optical correction.

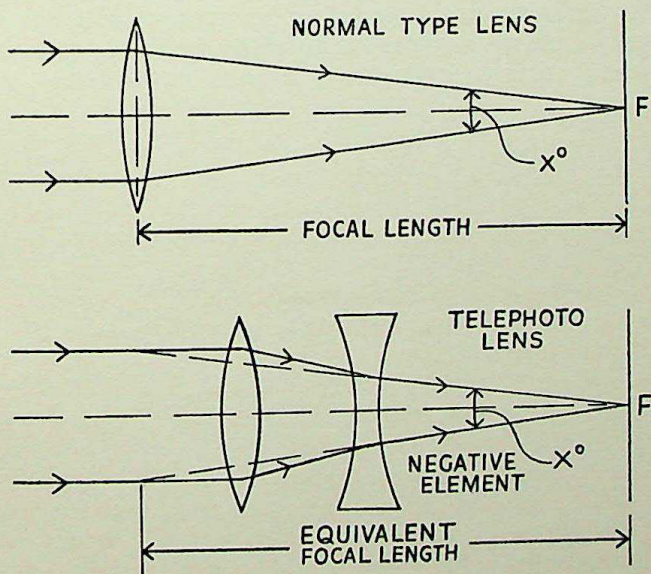


Fig. 27. Normal and telephoto lenses compared.



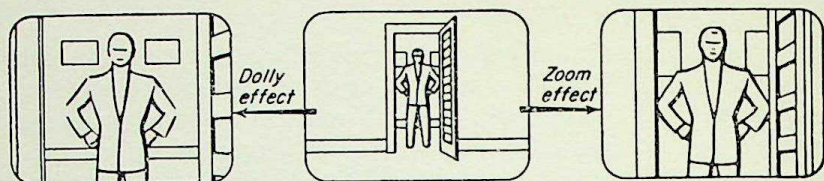


Fig. 28. A comparison of the enlarged images obtained from moving the camera forward (dolly) and increasing the focal length of the lens (zooming).

### Zoom Lenses

The old method of obtaining a rapid enlargement of the subject within the picture frame was to move the camera bodily forward or to cut to a close-up shot taken with another camera or a longer focus lens. In the first case, the dolly-in might be jerky and relatively slow with some image distortion, and in the second there is an obvious break in continuity.

The disadvantages noted above can be overcome with a variable focus lens of the zoom type. This permits the focal length to be varied quickly and smoothly during operation and without losing correct focus.

## 5

## SOUND

THE LOUDNESS of a sound is indicated by its amplitude, pitch depends on frequency and musical quality is imparted by the basic frequency modified by the associated harmonics and overtones. Harmonics are sounds with frequencies that are integral multiples of the fundamental (lowest frequency) wave.

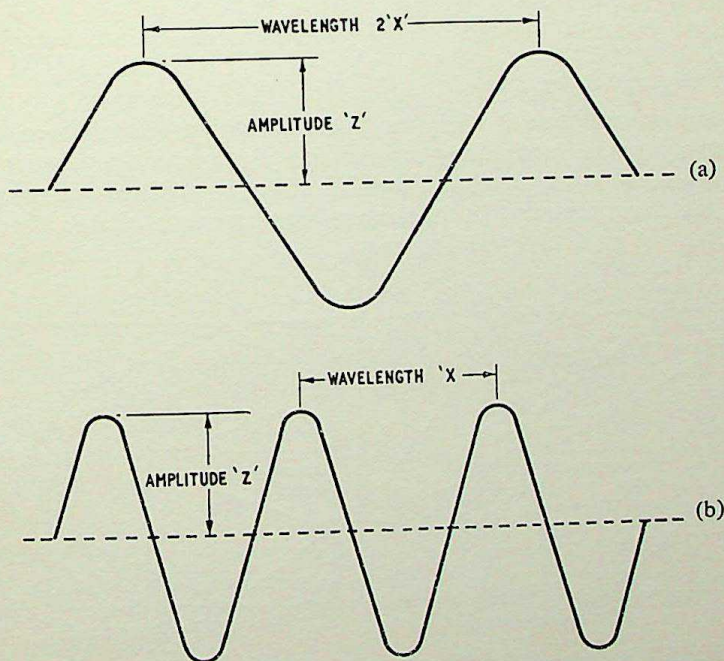


Fig. 29. A diagrammatic representation of a sound wave (a), and an associated harmonic (b).



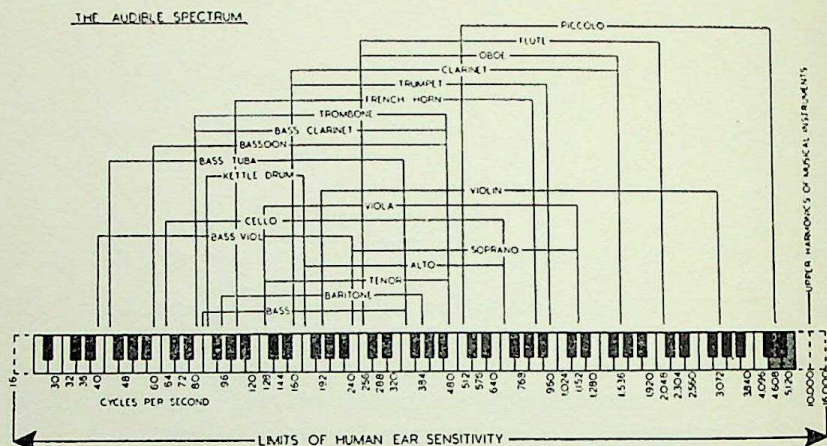


Fig. 30. The audible spectrum.

### Using Microphones

Any microphone is only as good as its associated amplifying apparatus in successfully reproducing a range of frequencies, but it is usual to employ types capable of better performance than the minimum necessary. In the range of instruments available, there are many of apparently similar characteristics which vary considerably

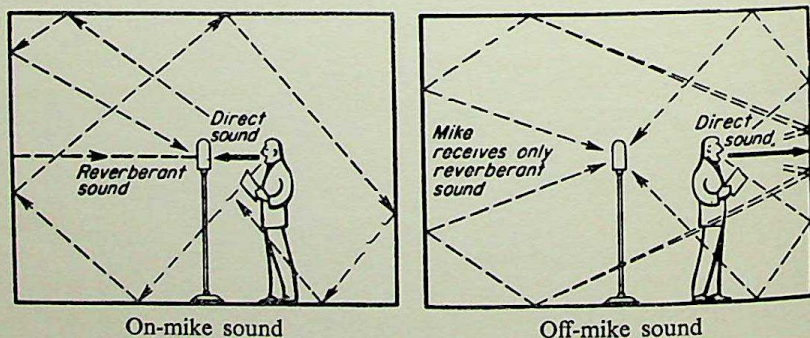


Fig. 31. When the ratio of direct to reverberant sound is high, the sound picked up is "on-mike"; and when the ratio is unity, or reverberant sound predominates, the result is "off-mike" sound.

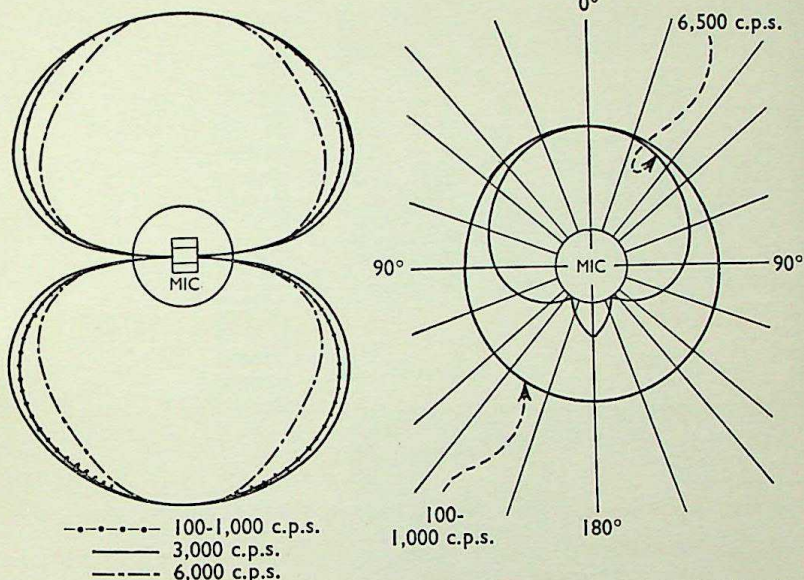


Fig. 32. Polar charts showing frequency response of (a) a typical bi-directional velocity microphone and (b) a pressure microphone that is non-directional at low frequencies.

in uniformity of response throughout the same frequency range, and this is one of the factors that make the choice of microphone such an individual affair.

Apart from its frequency response, the other fundamental feature of a microphone is its directional quality and this is shown by the polar charts of Figure 32.

### Film Sound Tracks

The two main types of optical sound on film recording are those producing variable area and variable density tracks. Whilst the concerns manufacturing the requisite equipment produce both kinds, the variable area system is usually associated with RCA and variable density with Westrex.

The variable area track being produced in Fig. 34 is termed "bilateral", because the modulations are identical about a vertical



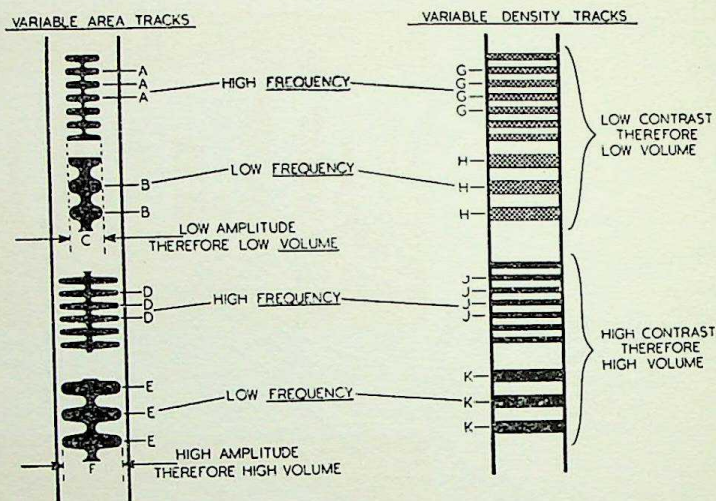


Fig. 33. Negative variable area and variable density sound tracks compared.

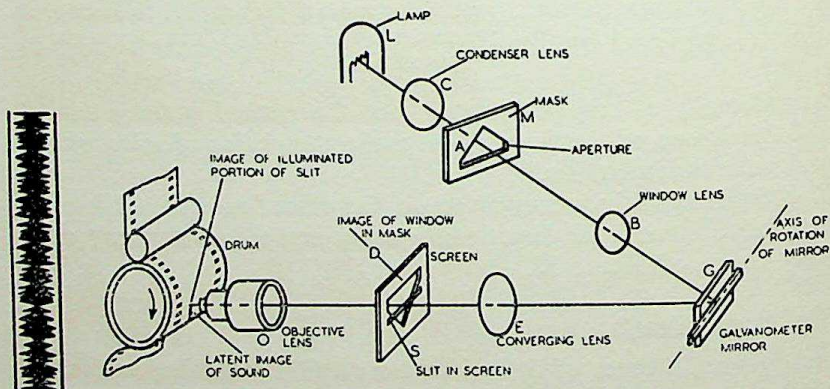


Fig. 34. Bilateral variable area recording.

geometrical centre line. Older tracks had a single “unilateral” modulation, displaced to one side of the sound track area (Fig. 35).

Fig. 35. A unilateral variable area sound track.

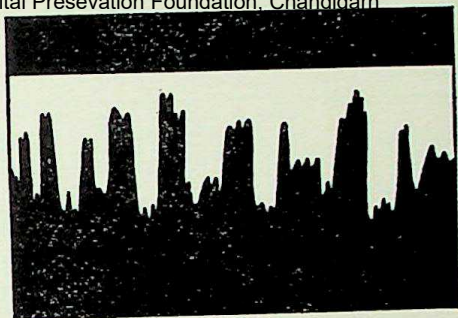


Fig. 36. A shuttered bilateral variable area sound track.

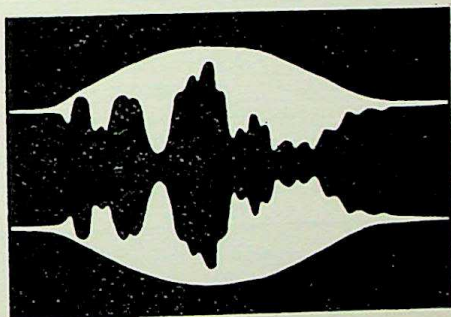
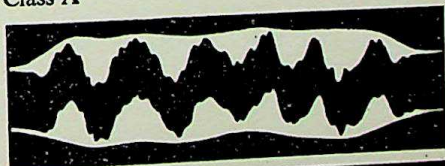
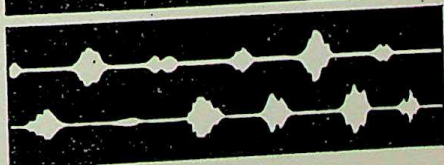


Fig. 37. Push-pull Class-A and Class-B variable area sound tracks.

Class A



Class B





## PLAYING TIME FOR TWIN-TRACK TAPE RECORDERS

## Standard Tape

| Spool Size           | .. | .. 3" & 3½" dia. | 5" dia.         | 5¾" dia.        | 7" dia.         |
|----------------------|----|------------------|-----------------|-----------------|-----------------|
| Tape Length (feet)   | .. | 175              | 600             | 850             | 1,200           |
| Hrs., Mins., Secs.   | .. | <i>h. m. s.</i>  | <i>h. m. s.</i> | <i>h. m. s.</i> | <i>h. m. s.</i> |
| Tape Speed 7½ i.p.s. | .. | 9 20             | 32 0            | 45 20           | 1 4 0           |
| Tape Speed 3¾ i.p.s. | .. | 18 40            | 1 4 0           | 1 30 40         | 2 8 0           |
| Tape Speed 1½ i.p.s. | .. | 37 20            | 2 8 0           | 3 1 20          | 4 16 0          |
| Tape Speed ⅞ i.p.s.  | .. | 1 14 40          | 4 16 0          | 6 2 40          | 8 32 0          |

## Long-Play Tape

| Spool Size           | .. | .. 3" & 3½" dia. | 5" dia.         | 5¾" dia.        | 7" dia.         |
|----------------------|----|------------------|-----------------|-----------------|-----------------|
| Tape Length (feet)   | .. | 250              | 850             | 1,200           | 1,800           |
| Hrs., Mins., Secs.   | .. | <i>h. m. s.</i>  | <i>h. m. s.</i> | <i>h. m. s.</i> | <i>h. m. s.</i> |
| Tape Speed 7½ i.p.s. | .. | 13 20            | 45 20           | 1 4 0           | 1 36 0          |
| Tape Speed 3¾ i.p.s. | .. | 26 40            | 1 30 40         | 2 8 0           | 3 12 0          |
| Tape Speed 1½ i.p.s. | .. | 53 20            | 3 1 20          | 4 16 0          | 6 24 0          |
| Tape Speed ⅞ i.p.s.  | .. | 1 46 40          | 6 2 40          | 8 32 0          | 12 48 0         |

N.B.—The above figures are calculated times and do not allow for individual machine speed variations.

## 6

# LIGHT AND LIGHTING EQUIPMENT

## The Nature of Light

VISIBLE LIGHT consists of electromagnetic waves travelling at a speed of 186,300 miles per second (approximately 300 million metres per second) through space. Many types of radiation belong to the same group of electromagnetic waves, and some of these are, in order of increasing wavelength: gamma rays, X-rays, ultra-violet rays, visible light, infra-red rays and broadcasting waves.

Electromagnetic wavelengths are very short by comparison with terrestrial distances, and so special units of measurement are used. These are as follows:

|                        |                                                                                  |
|------------------------|----------------------------------------------------------------------------------|
| Ångström Unit (A.U.)   | 1 A.U.=one ten millionth part of a millimetre, or $10^{-7}$ mm.                  |
| Millimicron (m $\mu$ ) | .. 1 m $\mu$ =one millionth part of a millimetre, or $10^{-6}$ mm.=10 A.U.       |
| Micron ( $\mu$ )       | .. .. 1 $\mu$ =one thousandth part of a millimetre, or $10^{-3}$ mm.=10,000 A.U. |

Those wavelengths between 3,900 A.U. and 7,600 A.U. are usually considered to be in the visible light spectrum. The constituent parts of this spectrum can be seen when white light is split up in passing through a prism, or by water vapour in the upper atmosphere to form a rainbow. The approximate limits of the colours in the visible light band and its associated radiations are as follows:

|                |    |    |    |    |    |                       |
|----------------|----|----|----|----|----|-----------------------|
| Cosmic rays    | .. | .. | .. | .. | .. | 0.0002 to 0.0005 A.U. |
| Gamma rays     | .. | .. | .. | .. | .. | 0.005 to 0.1 A.U.     |
| X-rays         | .. | .. | .. | .. | .. | 0.1 to 100 A.U.       |
| Ultraviolet    | .. | .. | .. | .. | .. | 100 to 3,900 A.U.     |
| Visible violet | .. | .. | .. | .. | .. | 3,900 to 4,250 A.U.   |
| Visible blue   | .. | .. | .. | .. | .. | 4,250 to 4,900 A.U.   |



|                                                              |                       |
|--------------------------------------------------------------|-----------------------|
| Visible green .. .. .                                        | 4,900 to 5,600 A.U.   |
| Visible yellow .. .. .                                       | 5,600 to 5,875 A.U.   |
| Visible orange .. .. .                                       | 5,875 to 6,300 A.U.   |
| Visible red .. .. .                                          | 6,300 to 7,600 A.U.   |
| Infra-red rays .. .. .                                       | 7,600 A.U. to 0.5 mm. |
| Experimental investigations .. .. .                          | 30 mm. to 300 mm.     |
| Radar and television .. .. .                                 | 300 to 3,000 mm.      |
| Television, short-wave radio and diathermy .. .. .           | 3 to 30 metres        |
| Low frequency navigation, medium and long-wave radio .. .. . | 30 to 3,000 metres    |

The frequency of any wave-motion can be found from the following formula by simple mathematics:

$$\text{Frequency of wave per second} = \frac{\text{Speed of wave per second}}{\text{Wavelength}}$$

The way in which wavelength is measured is shown in Fig. 38.

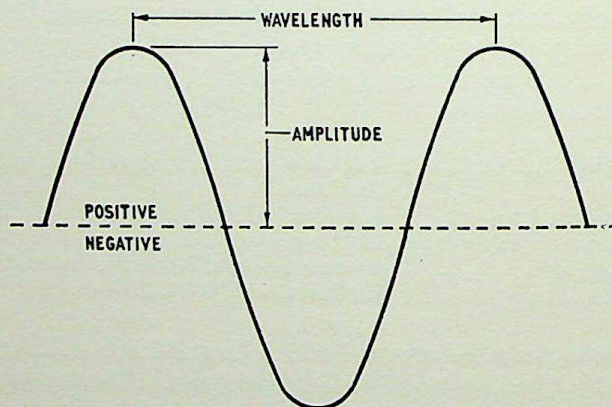


Fig. 38.

### Film Speed and Colour Sensitivity

Film speed is related to grain size, insofar as the fastest films tend to have the coarsest grain. However, considerable advances in manufacturing processes have been made over the last few years, and very high speeds are now possible with grain that is not over prominent in the final image.

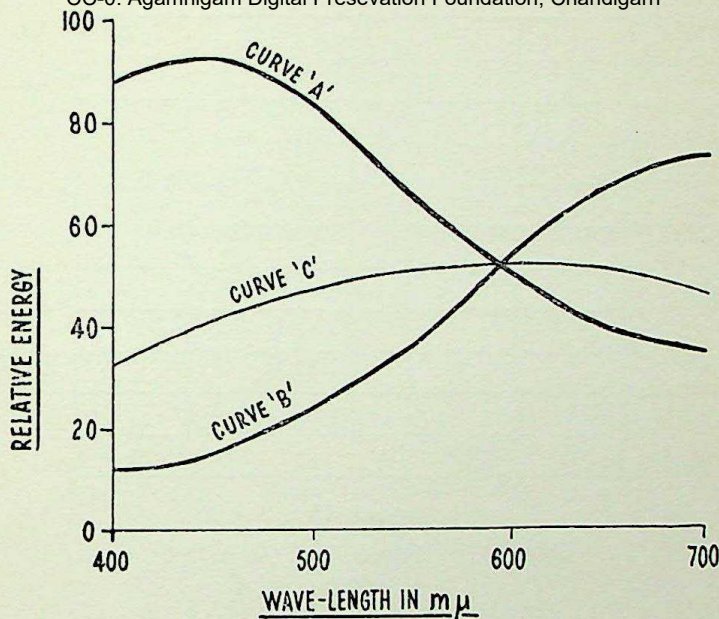


Fig. 39. The nature of energy emitted in the visible spectrum by: (a) daylight with a blue sky, (b) tungsten (half-watt) lamp, and (c) mean noon sunlight.

A plain silver bromide emulsion is only sensitive to ultra-violet, blue and blue-green light, and it cannot record scenes illuminated by other colours. In order to widen its scope, dyes are added during manufacture. When a film has been made sensitive to green and green-yellow, it is termed 'orthochromatic', and if sensitive to all colours including red, it is known as 'panchromatic'.

Fig. 39 shows the colour composition of blue sky daylight (curve A), tungsten lamp artificial light (curve B) and mean noon sunlight (curve C). From this, it becomes plain that panchromatic film is best for general purpose use, orthochromatic emulsions being blind to so much of the light emitted by tungsten lamps. In any case, panchromatic film gives better tone rendering because of its balanced colour sensitivity.



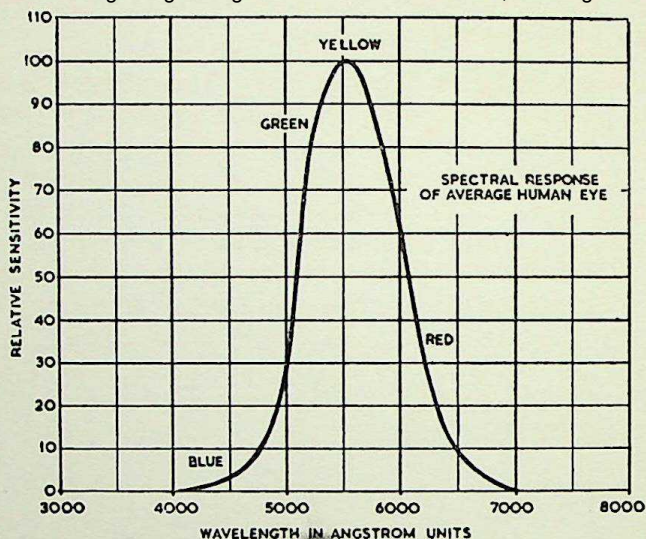


Fig. 40. Spectral response of the human eye.

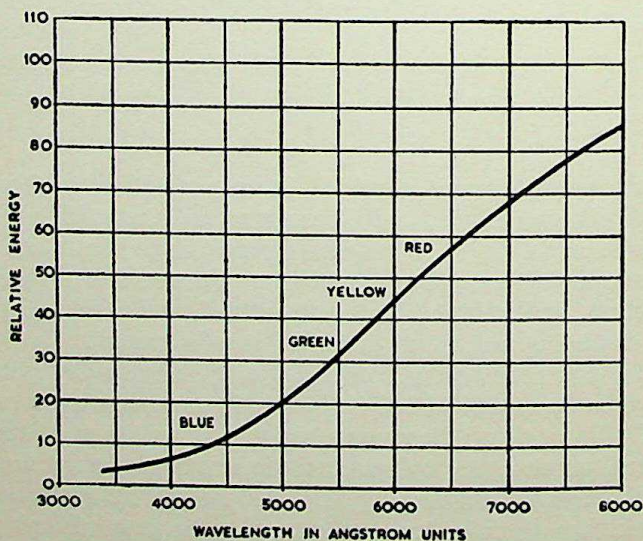


Fig. 41. Spectral characteristics of a tungsten filament lamp.

## Over-Run Light Sources

(a) *Ordinary Tungsten Filament Lamp.* This is the type used for domestic lighting and consists of a tungsten filament surrounded by compressed nitrogen or other inert gas. Lamps are obtainable both in the standard shape and as internally silvered reflector spotlights. When electricity flows through the filament it glows with a white heat, and the life of a lamp of this type is normally about 1,200 hours. This statement is only true if the lamp is run at the voltage for which it has been constructed: it will burn brighter at higher voltages (over-running), but its life will be reduced.

When the available current supply is restricted, over-running can provide a useful means of obtaining a greater than normal quantity of light, and the actual effect is shown in the table below.

| A.<br><i>Relative<br/>Voltage</i> | B.<br><i>Lamp-life<br/>(hours)</i> | C.<br><i>Relative<br/>Current<br/>Consumption<br/>(watts)</i> | D.<br><i>Lamp<br/>Efficiency<br/>(lumens per<br/>watt)</i> | E.<br><i>Colour<br/>Temperature<br/>° K</i> |
|-----------------------------------|------------------------------------|---------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------|
| 1.0                               | 1,200                              | 1.00                                                          | 10                                                         | 2,750                                       |
| 1.1                               | 600                                | 1.15                                                          | 12                                                         | 2,840                                       |
| 1.2                               | 250                                | 1.35                                                          | 14.5                                                       | 2,920                                       |
| 1.3                               | 130                                | 1.52                                                          | 17                                                         | 3,000                                       |
| 1.4                               | 65                                 | 1.72                                                          | 19.5                                                       | 3,080                                       |
| 1.5                               | 32                                 | 1.93                                                          | 22.5                                                       | 3,150                                       |
| 1.6                               | 18                                 | 2.15                                                          | 25.5                                                       | 3,220                                       |
| 1.7                               | 10                                 | 2.40                                                          | 29.5                                                       | 3,290                                       |
| 1.8                               | 6                                  | 2.60                                                          | 32.5                                                       | 3,350                                       |
| 1.9                               | 4                                  | 2.80                                                          | 36.5                                                       | 3,410                                       |
| 2.0                               | 2.3                                | 3.10                                                          | 41                                                         | 3,475                                       |

These figures are really subject to some amendment, as lamps vary in colour temperature according to the wattage, even when run at the rated voltage. The following colour temperatures are typical:

|        |    |    |    |           |          |    |    |           |
|--------|----|----|----|-----------|----------|----|----|-----------|
| 40 W.  | .. | .. | .. | 2,750° K. | 100 W.   | .. | .. | 2,835° K. |
| 200 W. | .. | .. | .. | 2,880° K. | 500 W.   | .. | .. | 2,935° K. |
| 750 W. | .. | .. | .. | 2,955° K. | 1,000 W. | .. | .. | 3,000° K. |



As an example of the use of the table, suppose that a lamp marked at 75 W. 200 V. is run off a 240 V. circuit. The actual voltage is then 1.2 times that for which the lamp is rated (i.e.  $240 \div 200 = 1.2$ ). At a relative voltage of 1.2 (column A), the life of the lamp is reduced from 1,200 to 250 hours (column B). The current consumption has risen (column C) from 75 W. to  $75 \times 1.35 = 101.25$  W. However, the lamp efficiency has also increased from  $75 \times 10 = 750$  lumens to  $101.25 \times 14.5 = 1,468.125$  lumens. Thus, by over-running the lamp 40 volts, its light output has been nearly doubled and the light has become less yellow, the colour temperature having risen from 2,750° K. to 2,920° K.

Reducing the voltage has the reverse effect but, as the light output is considerably reduced, it is not usual to do so except with projector lamps. However, it is common to employ a resistance in switching circuits so that the current supply can be reduced, except when the lamps are in operational use. Keeping a small current running through the filament of an incandescent lamp increases its life, as switching on and off is more injurious than low current burning. This is because of filament shock arising when after cooling it is suddenly raised to a high temperature, with the possible accompaniment of a current surge of short duration but high power.

It should be noted that if a lamp is over-run more than 1.3 times, a fuse must be inserted in the circuit that will melt at a current consumption only slightly greater than that the lamp will use. If this is not done, there is a danger that the lamp will explode on burning out.

(b) *Photoflood Lamps.* Photoflood lamps are already over-run and have high efficiency, but a short life. Both standard shape and internally silvered spotlight reflector photofloods are available, and their colour temperatures range from 3,100° K. to 3,400° K. The advantage of photofloods is that they permit a high light level to be obtained with a moderate current consumption and the internally silvered type produces a 60° soft-edged spot of high power without a reflector.

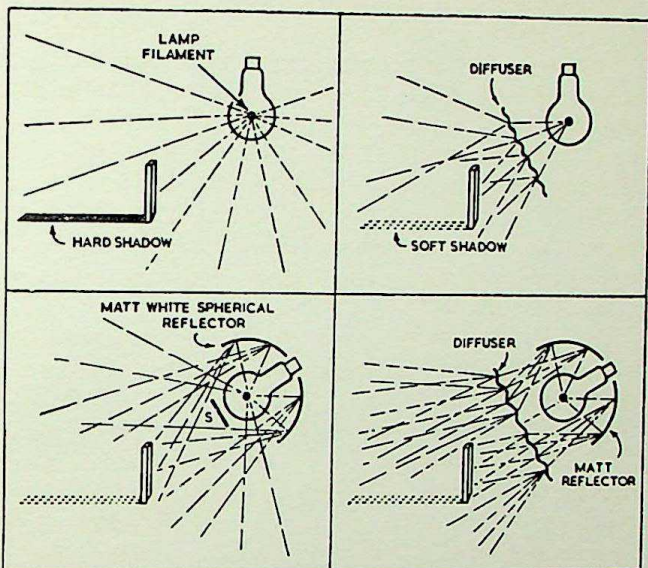


Fig. 42.

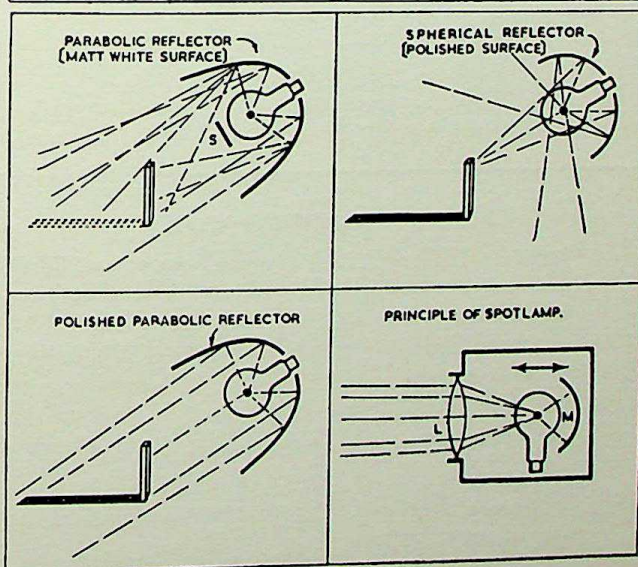
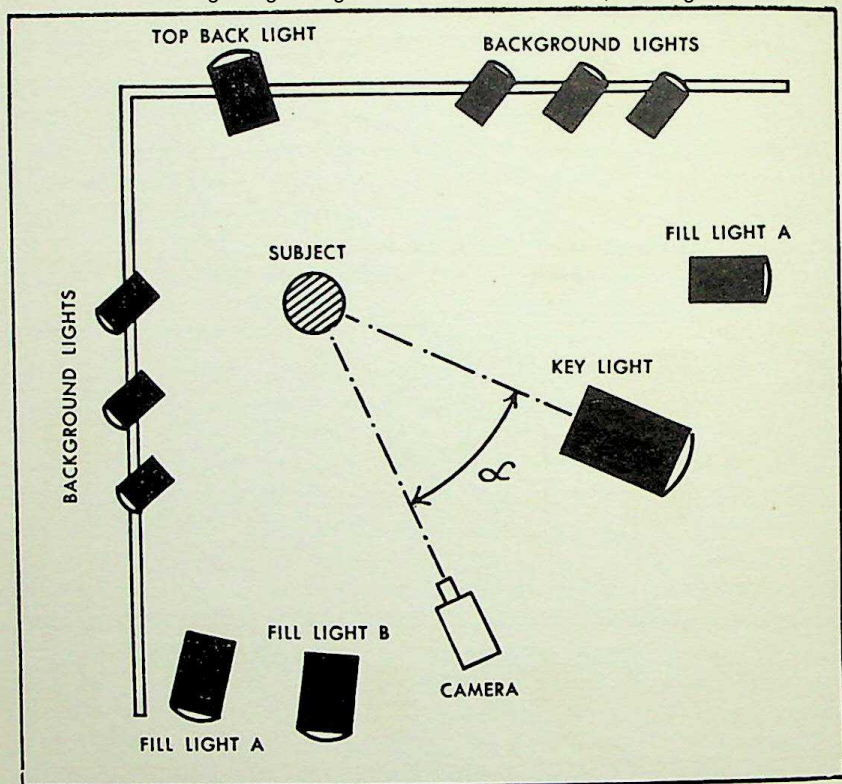


Fig. 43.





### LIGHTING CODE

**KEY LIGHT**—5000-watt Fresnel placed at angle  $\alpha$  (less than  $45^\circ$ ) from camera and at higher elevation than camera so as to break shadow between nose and upper lip.

**FILL LIGHTS**—Diffused, 2000- or 5000-watt Fresnel.

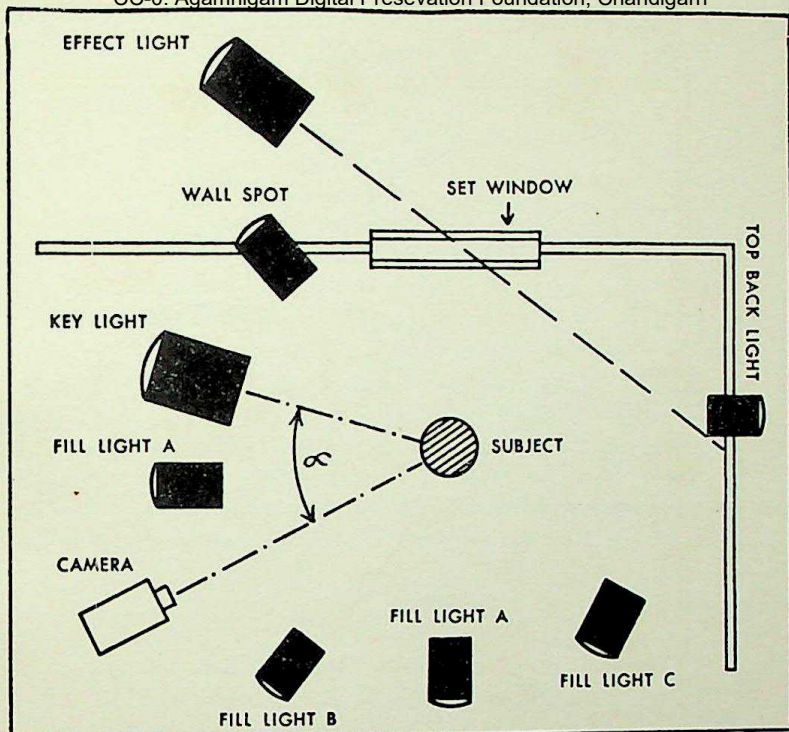
A. Placed at eye level.

B. Placed lower than eye level.

**TOP BACK LIGHT**—Diffused, 2000- or 5000-watt Fresnel.

**BACKGROUND LIGHTS**—Diffused or not, depending upon dramatic effect desired. 750- or 1000-watt Fresnel, mounted on top of scene flats.

Fig. 44. A typical film studio lighting arrangement.



### LIGHTING CODE

**KEY LIGHT**—5000-watt Fresnel placed about 24" above subject's eye level and at angle  $\infty$  (less than  $45^\circ$ ) from camera.

**FILL LIGHTS**—Diffused, soft, 2000-watt Fresnel:

- A. Placed at eye level.
- B. Placed below subject's waistline.
- C. Placed above for background control.

**TOP BACK LIGHT**—Diffused, 2000-watt Fresnel.

**WALL SPOT**—Diffused, 2000-watt Fresnel for background control.

**EFFECT LIGHT**—120-amp. Arc Fresnel for window effect on background

Fig. 45. A typical film studio lighting arrangement for window effect lighting.



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## Lighting Reflective Objects

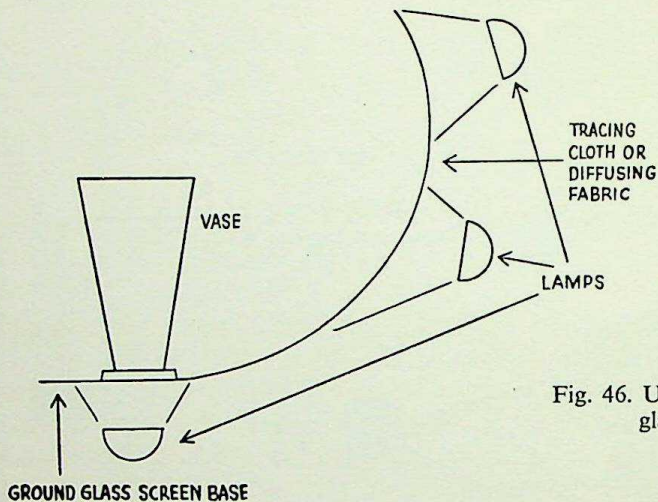


Fig. 46. Underlighting for glassware.

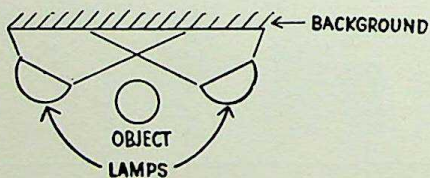
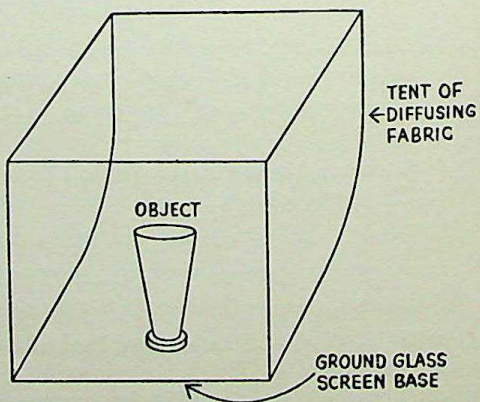


Fig. 47. Reflected rear-lighting.

Fig. 48. A diffusing tent for highly reflective objects.



## 7

## PROCESSING AND EDITING

## Exposure and Density

THE characteristic curve is a mine of information regarding any particular film, and one is shown diagrammatically in Fig. 49.

In Fig. 49, section A is called the “toe of the curve” or the region of underexposure. If an image is produced by exposures in this region, it will be underexposed, i.e. thin and lacking in contrast and detail. This is because increased exposures on the toe of the curve do not result in proportionally increased densities.

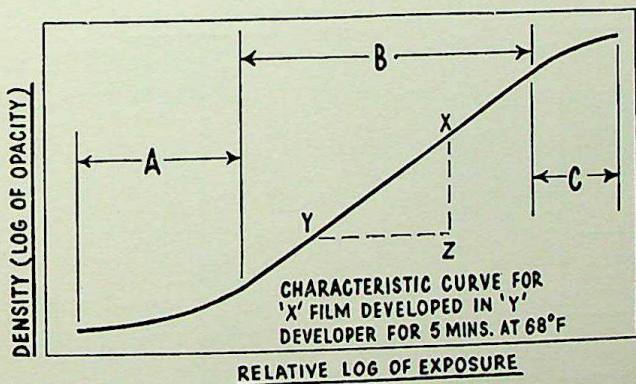


Fig. 49. The characteristic curve for a given film under stated conditions of development.

Section C is the “shoulder of the curve” or the region of overexposure. An image produced by exposures in this region will be overexposed, i.e. thick, lacking in contrast and having the highlights clogged up with excess silver.



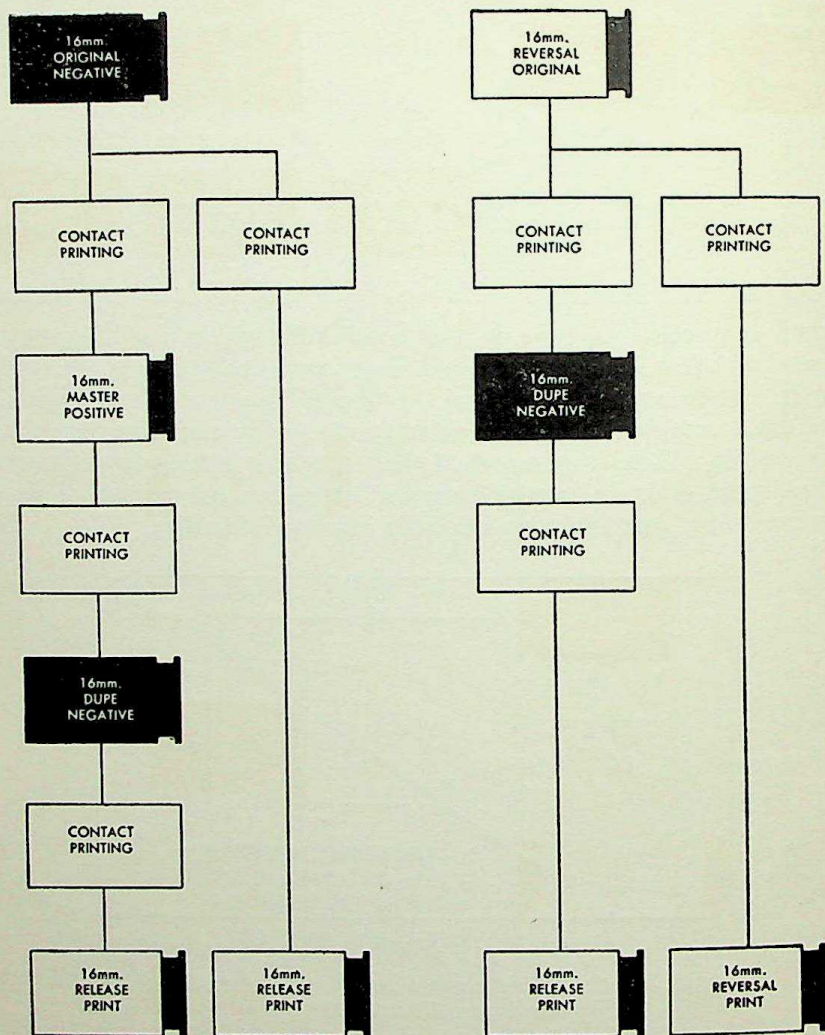


Fig. 50. Picture production methods from a 16 mm. negative or a 16 mm. reversal print.

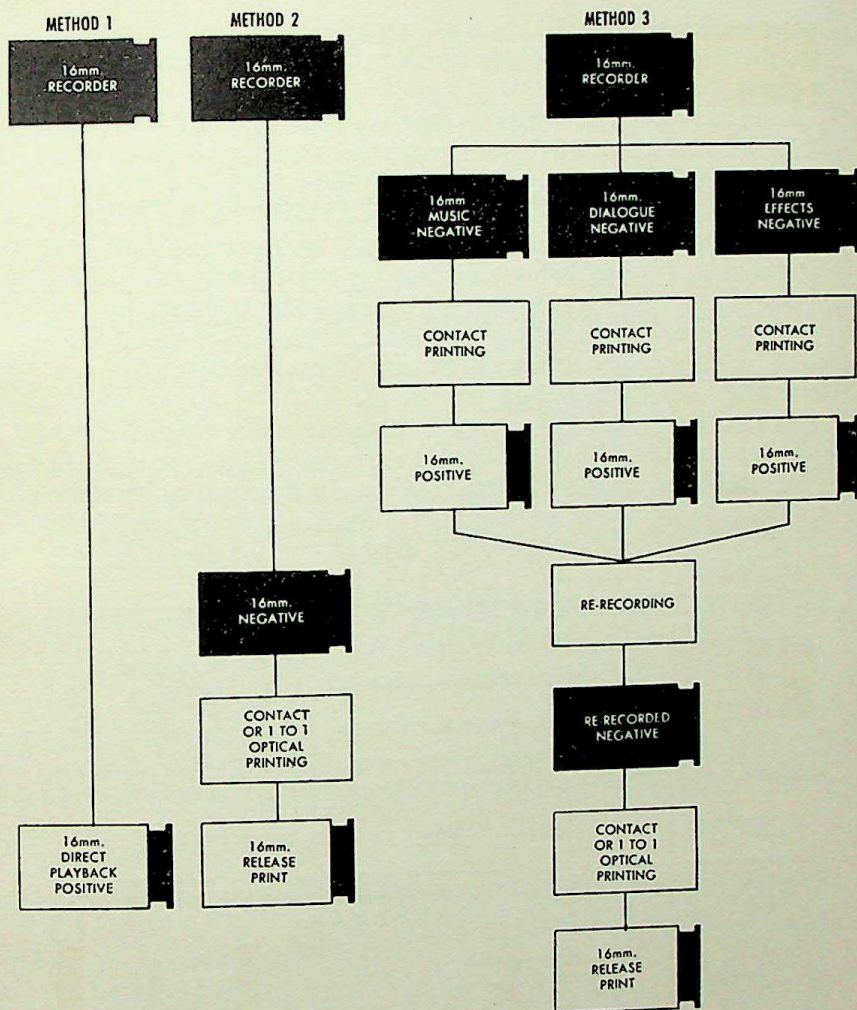


Fig. 51. Schematic diagram showing sound production methods for preparing 16 mm. sound release prints from 16 mm. sound negatives.

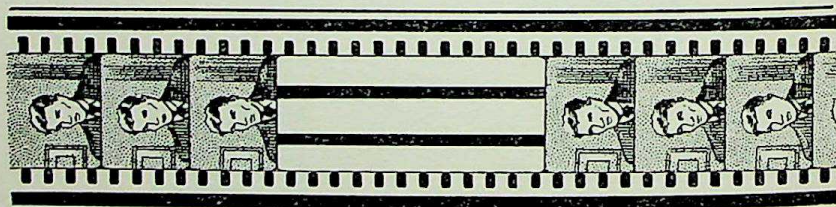


Section B is termed the region of correct exposure, and along this straight line portion, the ratio between the exposure and density is constant at all points.

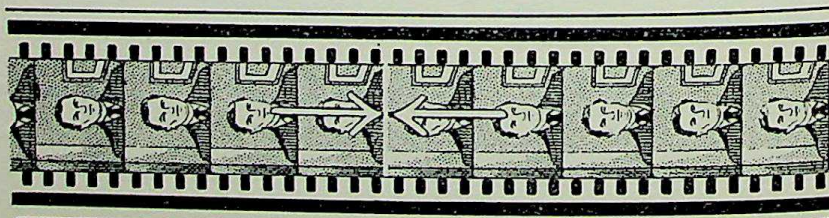
It will be noted from Fig. 49 that the film takes up a certain amount of light before there is any effect: that is, there is no increase in density. This is because each grain of silver bromide cannot be reduced to silver until it has received a certain minimum quantity of light. This inertia of the emulsion is kept as low as possible, and much research is devoted to ways and means of keeping the toe of the curve short. At the other end of the scale, density increases to a point on the shoulder of the curve, where increased exposure has no effect. This gives the maximum density of the particular film and developer combination being considered.

At the beginning of the curve is a section where there is some density, even when there has been no exposure. This is termed the "fog level" and is caused by traces of fog in the emulsion, and the resistance to the transmission of light of the clear emulsion and base.

### Film Editing

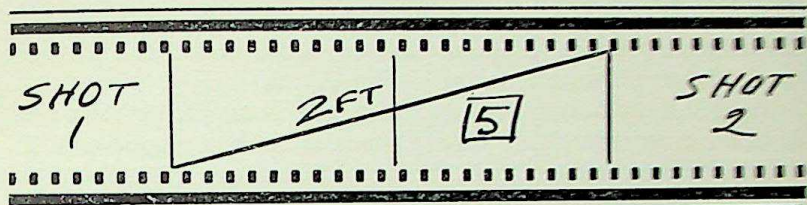


(a) *Instruction to build up missing material to continue the shot.*

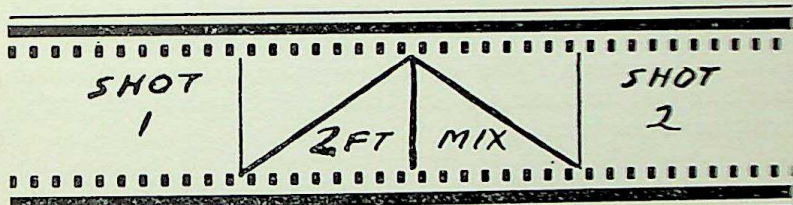


(b) *A jump cut; a section in a continuing shot having been removed.*

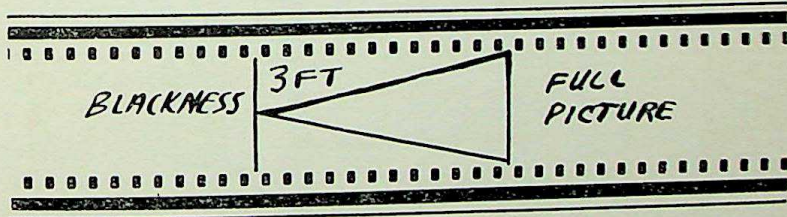
Fig. 52. Typical editorial marks.



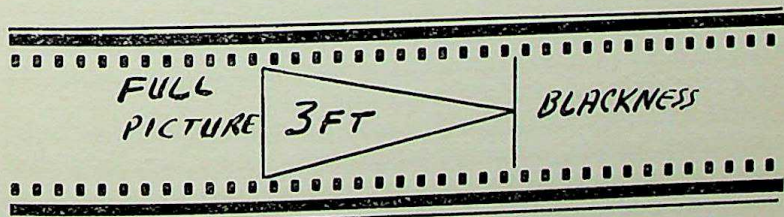
(c) A two-foot optical (type 5) to be included about a stated centre.



(d) A two-foot mix (or dissolve) between two shots, to be made about a stated centre.



(e) A three-foot fade-in from blackness to full picture to be inserted.



(f) A three-foot fade-out from full picture to blackness to be inserted.

Fig. 52. Typical editorial marks.



## Travelling Mattes

Travelling mattes are light modulators used in optical printers to obtain wipe, split screen and similar effects.

Fig. 53 shows how the two scenes A and D can be combined to form the composite film F through the use of the mattes B and E. When film A is being printed, the clear and opaque matte film B is placed in contact with it, and the result at the camera is the film C, in which parts of A have been eliminated. If the film C in the camera is then rewound to the first frame and film D is placed in the projector in contact with film matte E, a picture is projected that is the exact complementary of C in dimensions and so the composite film F is made in the camera. If film F were projected, the observed result would be that the scene A would be wiped off horizontally, being progressively replaced by scene D.

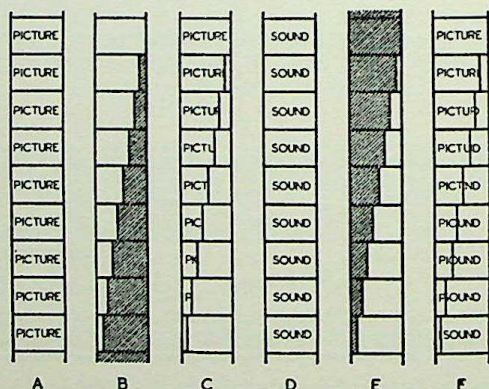


Fig. 53. The principle of a travelling matte.

Sharp-edged wipes are made when the matte is placed at one of the planes of principal focus of the lens, that is in contact with either the projected film or the raw stock.

An optical printer normally incorporates a means whereby mechanical mattes, consisting of suitable cut-out masks placed between the projected film and camera lens, can be operated to produce a similar effect to the conventional travelling matte. As the masks are not in contact with the film they are bound to be unsharp, and the degree of unsharpness can be varied as required.

## 8

# LEADERS AND SPLICING

### The Academy Leader

FOR many years the American Standard (Academy) Leader has been specified for use with motion picture films. In Britain, the B.S.I. Standard B.S. 1492 : 1948 is currently operative and the specification is equivalent in many respects to the American Standard A.S.A. Z22.55-1947. A difference is that B.S.I. provides for a 16 mm sound start mark for the convenience of users of that size and permits a maximum reel length of 2,050 ft in place of the American maximum of 2,000 ft. The British Standard film leaders and trailers are shown in Figure 54.

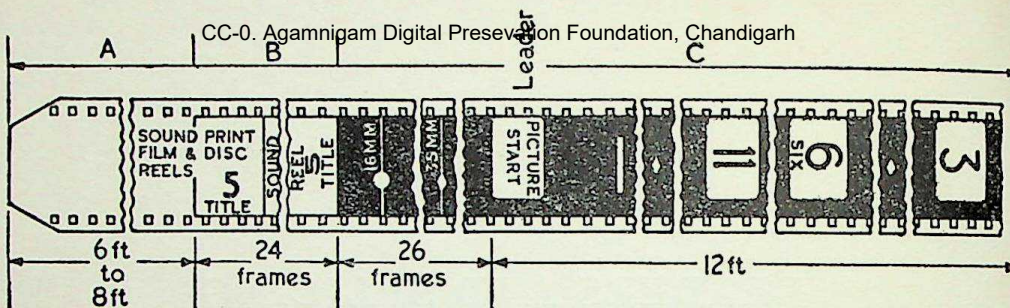
### Checking Splices

Even a perfect welded splice may break if given an immediate sharp tug. This is because some drying time is necessary before full strength is obtained. However, when making a number of joins it will be found that the ordinary pull exerted in re-winding is not harmful, and projection within a few minutes is possible without the risk of fracture.

When learning about splicing, it is best to practice on a number of old pieces of film first. In fact ancient greasy film provides information in a less easily forgotten form than the words in this book.

One good way of checking a splice is to see whether it contains any reflective patches. These are air pockets or partially removed binder and indicate points of weakness. Experience will tell whether the imperfections are too great for trouble-free projection, but in every case it is essential to seek the reason for the defects. It may be that the splicer itself needs attention, or that one's methods of operation are wrong. Having found the cause, the cure must be





### (A) PROTECTIVE HEAD-LEADER

Either transparent or raw stock.  
When the protective head-leader has been reduced to a length of 6 ft. it should be restored to a length of 8 ft.

### (B) IDENTIFICATION HEAD-LEADER (part title)

Shall contain 24 frames (1) in 6 of which shall be plainly printed lengthwise with the film, in white letters on a black background, (a) reel number, (b) picture title; (2) in 18 of which shall be plainly printed in black letters on a white background, (a) type of print, (b) reel number (Arabic numerals not less than  $\frac{1}{4}$  of frame height), and (c) picture title.

### (C) SYNCHRONIZING LEADER

The synchronizing leader shall consist of 26 frames before the 'picture-start' mark, and then 12 ft., including the 'picture-start' mark, to the picture. This leader shall be opaque, except as specified below:—

In the centre of the first frame there shall be printed, across the picture and sound track area, a white line  $\frac{1}{32}$  in. wide, upon which is superimposed a circle of  $\frac{3}{8}$  in. diameter. The words '16 mm.' shall be printed in letters  $\frac{3}{8}$  in. high on the right-hand side of the circle and immediately above the white line.

In the centre of the seventh frame there shall be printed across the picture and sound track, a white line  $\frac{1}{32}$  in. wide, upon which is superimposed a diamond  $\frac{1}{8}$  in. high. The words '35 mm.' shall be printed in letters  $\frac{3}{8}$  in. high on the right-hand side of the diamond and immediately above the white line.

Six of the next 15 frames may be used by the studio for sensitometric or other information. Any of this part of the leader not so used shall be opaque.

The 'picture-start' mark shall be the 27th frame, in which shall be printed 'picture-start' (inverted) in black letters on white background. The standard camera aperture height of 0.631 in. shall be used in photographing this frame, and all others between the 'picture-start' mark and the beginning of picture.

From the 'picture-start' mark to the picture, the leader shall contain frame lines which do not cross the sound track area and the sound track area shall be opaque.

Beginning 3 ft. from the first frame of picture, each foot shall be plainly marked by a transparent frame containing an inverted black numeral at least  $\frac{1}{8}$  frame height. Footage indicator numerals shall run consecutively from 3 to 11, inclusive. In the frames in which the numerals '6' and '9' appear, the words 'six' and 'nine' (also inverted) shall be placed immediately below the figure, to eliminate the possibility of misreading in the projection room due to the similarity between the inverted numerals. At a point exactly 20 frames ahead of the centre of each footage numeral frame, there shall be a diamond (white on black background)  $\frac{1}{8}$  in. high by  $\frac{3}{8}$  in. wide.



#### (D) PICTURE SECTION

The length of a standard reel shall be not more than 2,050 ft. including the leaders and run-outs.

**MOTOR CUE.** Circular opaque marks with transparent outlines printed from a negative which has had four consecutive frames punched with a die 0.094 in. in diameter. The centre of these holes shall be half-way between the top and second sprocket holes, 0.281 in. from the right-hand edge of the film with heads up and emulsion toward the observer. Following the 4 frames containing the circular opaque marks there shall be 10 ft. plus 12 frames to the beginning of the change-over cue.

**CHANGE-OVER CUE.** Four frames containing circular opaque marks, punched similarly to and of the same dimensions and position on the frame as the motor cue. Following the change-over cue marks there shall be 18 frames to the beginning of the run-out leader.

(E) **RUN-OUT LEADER.** This shall be opaque, 3 ft. in length.

#### (F) IDENTIFICATION TAIL-LEADER (end-of-part title)

Shall contain 24 frames (1) in 18 of which shall be plainly printed in black letters on a white background (a) end of reel, (b) reel number (Arabic numerals not less than  $\frac{1}{4}$  of frame height), and (c) picture title; (2) in 6 of which shall be printed lengthwise with the film in white letters on a black background, (a) end of reel, (b) picture title.

#### (G) PROTECTIVE TAIL-LEADER

Same as protective head-leader (see (A) above).

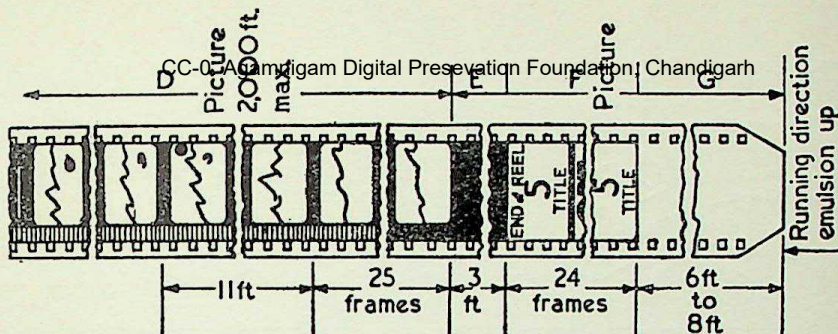
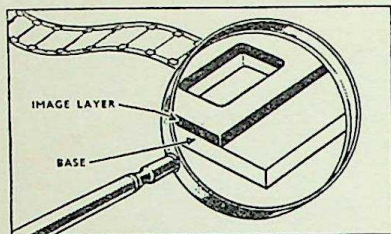


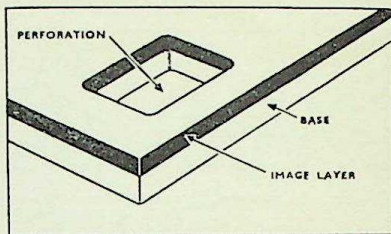
Fig. 54. Abstract from British Standard B.S. 1492: 1948 relating to leaders and trailers from 35 mm. release prints.



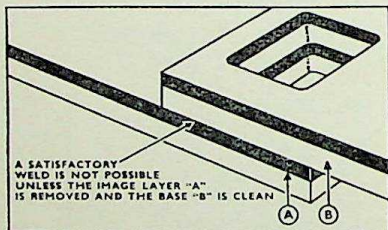
# The Splicing of Cine Film with Perforation Overlap



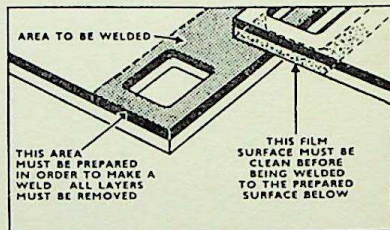
(a) If a section of cine film were to be greatly magnified two main layers would be seen. Some films are coated on both sides of the base and so have three main layers.



(b) The flexible film base supports the light-sensitive emulsion and they are held together by a substratum layer or binder.



(c) It is impossible to splice the base side of one piece of film to the image side of another. Full contact must be made between the two film bases.



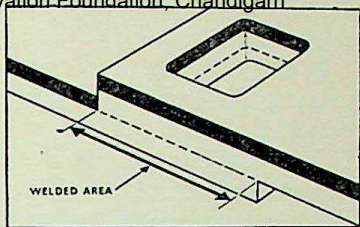
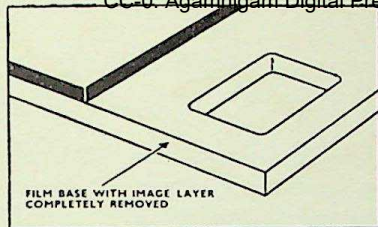
(d) To make a welded splice, all emulsion and binder must be removed from the surface of one film and the base side of the other must be free from dirt and grease. If the films are coated on both sides, then care must be taken to scrape clean the two surfaces to be joined.

Fig. 55. The splicing of cine film with perforation overlap.

rapid and definite, because breaks on projection are always troublesome, embarrassing and usually unnecessary. By the same token, before projecting anyone else's films, always check them on the rewind bench to ensure that all the splices are sound.

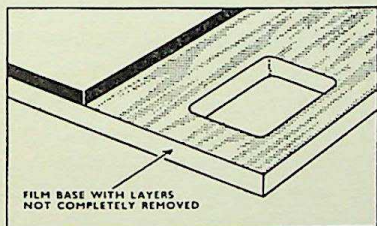
Fig. 55 indicates some of the points to be observed in making a good weld, and care in these matters will be amply repaid by splices that do not break in projection.



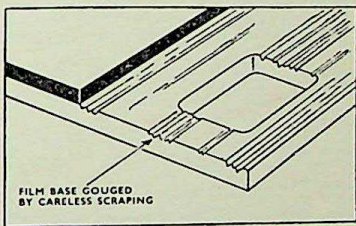


(e) Correct scraping should result in a dull or frosty appearance, but scraping should not be so excessive as to weaken the base. The surface should be clean and dry and the cement applied thinly and evenly.

(f) A perfect splice is a weld, such that one side of the film base is partly dissolved into the other section being joined. With most splicing apparatus, the pressure during splicing must be maintained for 10 to 30 seconds.



(g) If any emulsion or binder remains between the bases being joined the weld will be imperfect and the splice may not hold. The binder is sometimes difficult to remove and it may easily be recognised by its hard glossy appearance.



(h) Scratching or gouging the film base, particularly near the image-layer edge, weakens the weld and may cause a break at this point.

Fig. 55. The splicing of cine film with perforation overlap.

If a splice does break, the following points should be checked:

- (1) Is the surface from which the emulsion has been removed dull and clean, or are spots of shiny binder in evidence?
- (2) Is the back of the other film clean, or is there dirt, oil, or a second emulsion coating?
- (3) Is the cement fresh, or has the solvent evaporated, leaving a thick gummy mixture?
- (4) Is the cement of the correct type?



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(5) Is the splicer pressure even, sufficiently strong and held for long enough?

(6) Has scraping been even and only of a depth necessary for removing the emulsion and binder?

(7) Is the film very old?

If scraping has been too deep, it may be found that a break will occur at one end of the weld where there is maximum weakness. With old film, the base is often too dry and an application of cement for a few seconds softens it, this being wiped off prior to a second coating for normal splicing. If this procedure is carried out carefully it can be very successful, but there is always a risk of the film buckling and it should only be employed as a last resort. A buckled splice is typical of the use of too much cement and this can cause the film to jam or jump the sprockets on projection.

## 9

## FILM PROJECTION

### Selecting a Screen

ONE of the puzzling things to the newcomer to projection is that there are so many different types of screen. Each, however, has its own distinctive qualities and which you should buy will depend on the conditions under which projection will normally take place. In an emergency, a white linen sheet, cartridge paper or a light painted wall will do, but for normal work the quality must be rather better.

Figure 59 shows the degree of reflectance obtained with various types of screen and the effect of angle of view.

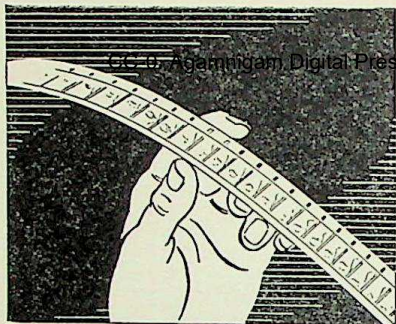
A white screen reflects fairly evenly, but the absorption of light is high. Silver screens give an excellent picture to those seated directly in front of it, but as the viewing angle decreases, so distortion of the image and light fall-off increases. The glass beaded screen has a surface that is covered with small balls of glass, and it has even greater reflectance power than the silver screen. However, there is less distortion and light fall-off with glass beads, but these screens are difficult to keep in peak condition if they have to be rolled for travelling.

In the special category are translucent screens for back projection (such as on exhibition stands), and perforated screens. The perforated screen is made of woven cloth and if the projector loudspeaker is placed behind it, the sound comes through the perforations in the weave. In this way, the sound really does come from the screen.

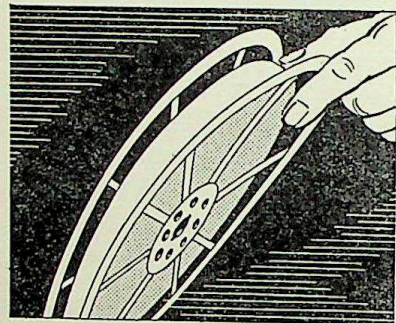
Before giving a show in a new location, start the projector running and try observing the picture from the seats that the audience will use. In this way any errors in placement of the screen or seats will become immediately apparent and corrections made in good time. The golden rule for projection is: always check everything in advance.



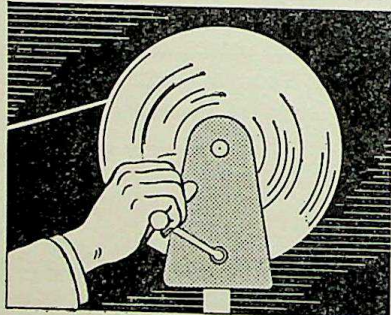
## FOUR TIPS ON FILM CARE



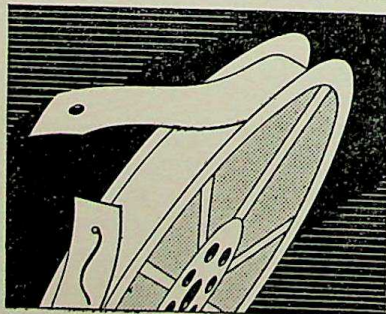
1. Handle films only by their edges and with clean dry hands.



2. Use clean, straight spools, and always lift loaded spools by the finger-holes, *not* by their edges.



3. Rewind slowly and keep the film taut. Wind the film with a uniform compactness. Keep the spool-arms correctly aligned and rigid.



4. Prevent chafing of the film edge during transport by wrapping tape around the spool. Paper tape is clean and you can write on it details about the film.

Fig. 56.



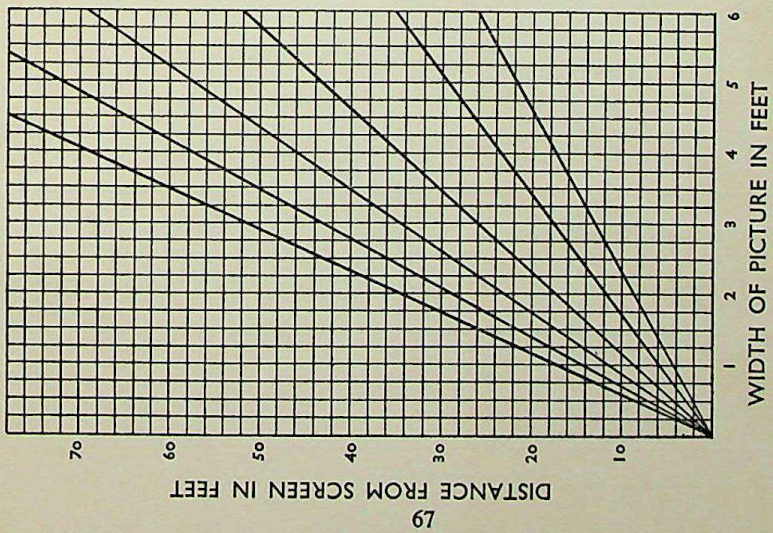


Fig. 57. Lens projection chart for 8 mm. silent film.

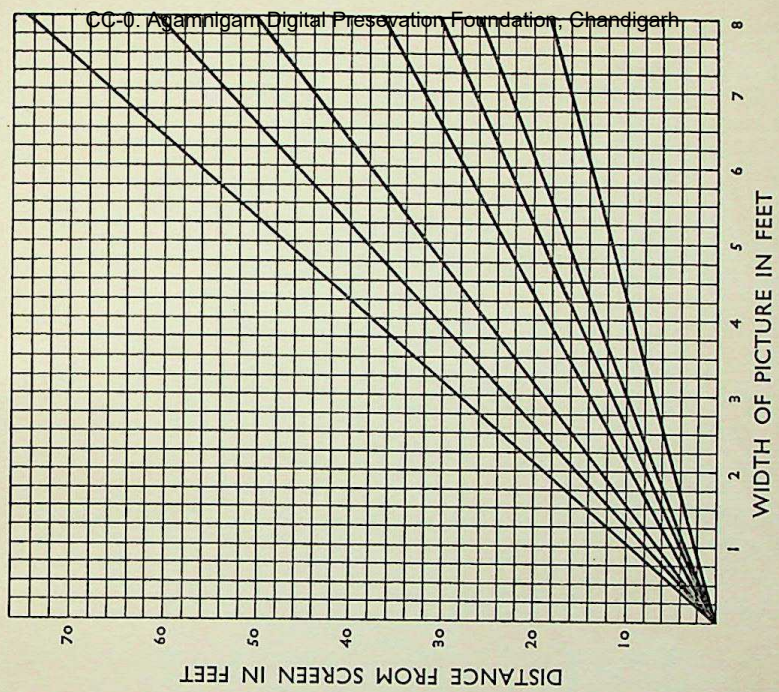


Fig. 58. Lens projection chart for 9.5 mm. silent film.



## Lens Projection Data

The formula and its transposition given below enable one to find either

- (a) Distance of projection with given size picture and lens;
- (b) Size of picture with given projection distance and lens;
- (c) Effective focal length of lens required for given size picture and projection distance.

$$(a) D = \frac{P}{G} \times F + F. \quad (b) P = \frac{(D-F)G}{F}. \quad (c) F = \frac{D}{\frac{P}{G} + 1}$$

Where D = throw

P = width of picture

F = Focal length of lens.

G = width of gate.

*Example (a).* What must be the distance of screen to obtain a picture 4' wide, using 2" projection lens and gate .4" wide?

$$D = \frac{48}{.4} \times 2 + 2 = 242" = 20' 2".$$

*Example (b).* What will be the size of the picture given by a 2" lens at 20' 2" projecting from a gate .4" wide?

$$P = \frac{242-2}{2} \times .4 = 48" = 4'$$

*Example (c).* What focal length lens would be required to project a picture 4' wide from a gate .4" wide at a distance of 20' 2"?

$$F = \frac{242}{\frac{48}{.4} + 1} = \frac{242}{120+1} = 2".$$

**IMPORTANT.**—All measurements *must* be in the same units, i.e. inches or feet, etc.

| Angle<br>of Viewer<br>to Normal<br>at Screen | Proportion of Transmitted Light viewed by<br>Comparison with Beaded Screen |        |       |
|----------------------------------------------|----------------------------------------------------------------------------|--------|-------|
|                                              | Beaded                                                                     | Silver | White |
| 0°                                           | 100%                                                                       | 84%    | 35%   |
| 20°                                          | 38%                                                                        | 42%    | 32%   |
| 50°                                          | 16%                                                                        | 7%     | 20%   |

Fig. 59. Reflectance of varying types of screen at different viewing angles.

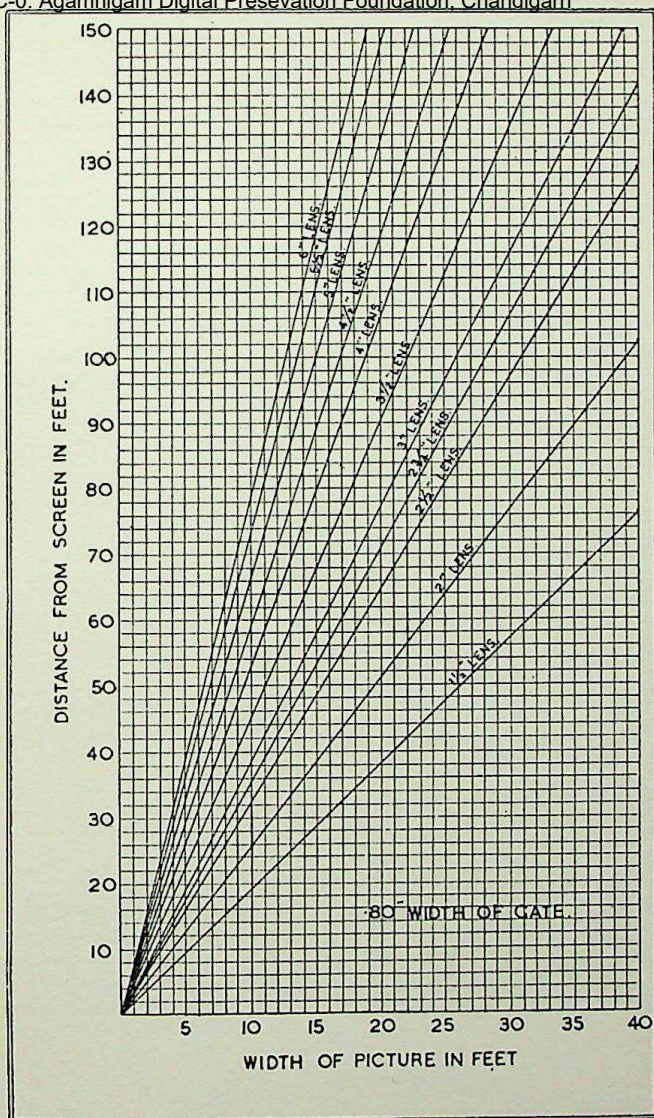


Fig. 60. Lens projection chart for 35 mm. film.



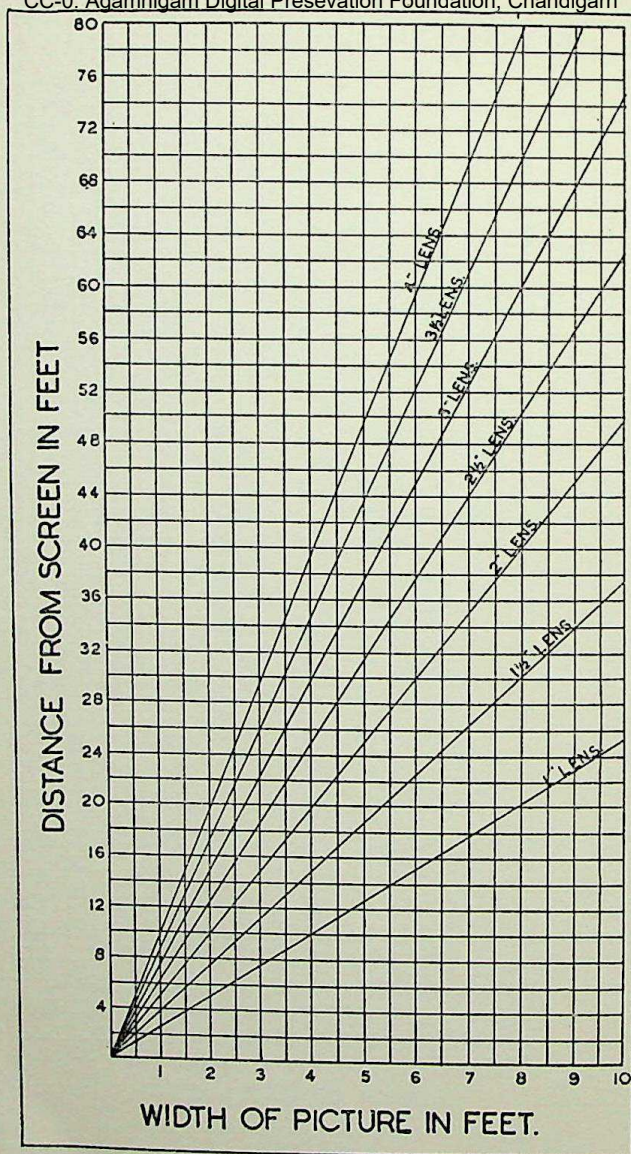


Fig. 61. Lens projection chart for 16 mm. film.

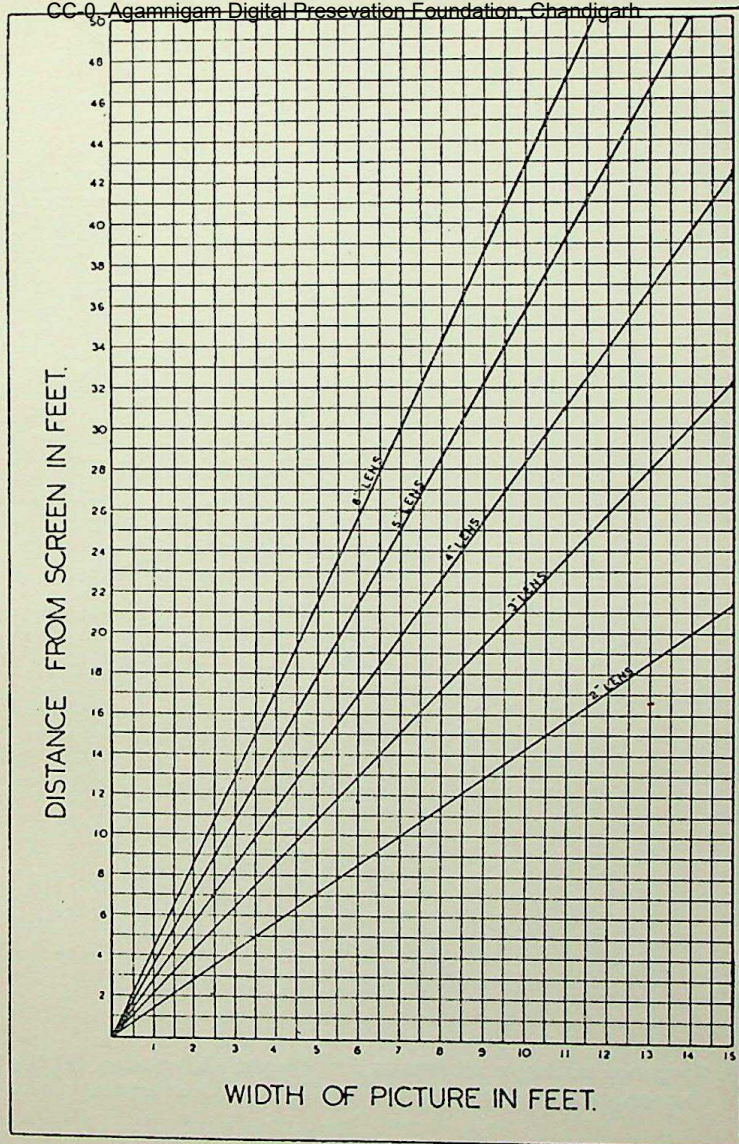


Fig. 62. Lens projection chart for 24 in. x 36 mm. slides.



## Seating the Audience

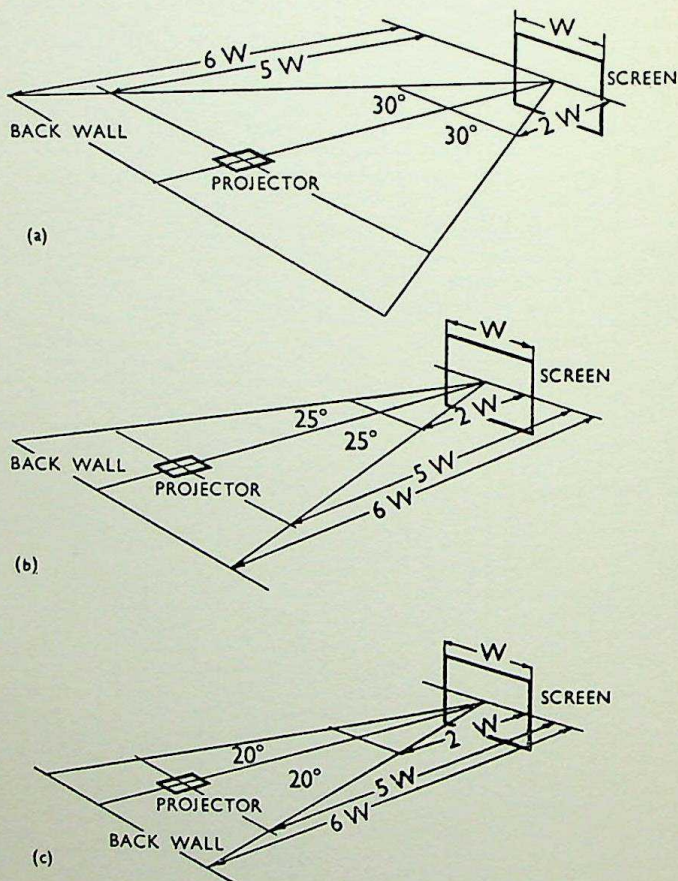


Fig. 63. Suggested seating arrangements for (a) matt white screen, (b) beaded screen, and (c) silver screen. (Note:  $W$  = width of screen.)

## PART II





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## DICTIONARY OF CINEMATOGRAPHY AND SOUND RECORDING

*This Dictionary contains a comprehensive list of definitions of terms used in amateur and professional cinematography and recording. When a word or term is separately defined, then it has been shown in italics. In cases where there is an American or British Standard definition, the letters A.S.A. or B.S.I. have been inserted followed by the appropriate publication reference numbers.*

**Absorption factor.** A.S.A. Z7.1-1942 30.130. The absorption factor of a body is the ratio of the light absorbed by the body to the *incident light*. (The absorbed light is the difference between the *incident light* and the sum of the transmitted and reflected light.)

**Absorption loss.** A.S.A. Z24.1-1951 2.245. Absorption loss is that part of the *transmission loss* due to the dissipation or conversion of sound energy into other forms of energy (e.g., heat), either within the medium or attendant upon a reflection.

**Abstract set.** A film or television *set* designed to be purely decorative and without too definite a location.

**Academy leader.** The *leader* affixed to the beginning and end of films by the *laboratory* and originally made in accordance with the specifications of the Academy of Motion Picture Arts and Sciences in the U.S.A. Apart from affording protection to the *sound* and picture areas, the *leader* contains picture and sound threading instructions, reel change-over cue marks and other useful information for the projectionist. The term is now widely used to mean a standard film *leader* made to the American specification Z22.55-1947, or the British equivalent, 1492 : 1948.

**Accelerated motion.** This is the apparently increased speed of movement obtained by projecting at normal speed a film that has been taken at less than normal speed when *shooting*.

**Accent.** Variation or emphasis of a part of action or sound in order to give interest to a uniform *scene*.

**Acetate base.** Abbreviation for *cellulose acetate base* or *cellulose tri-acetate base*. (1) In cinematography, this is the safety *base* on which light sensitive *emulsion* is coated to form *non flamm* film. Film of this type can be destroyed by fire, but it will not burn rapidly and violently, as does the now obsolete *cellulose nitrate base*. (2) The original type of base for magnetic recording tape, now largely superseded in Britain by P.V.C. and polyester bases.

**Acetate discs.** A.S.A. Z24.1-1951 8.555. Acetate discs are mechanical recording discs, either solid or laminated, which are made of various acetate compounds.

**Achromat.** The name given to a *lens* that has been colour corrected so that all *wavelengths* of light from a common point source come to *focus* in the same *image* plane after passing through the *lens*. All modern lenses are corrected in this way and the non-corrected types produce images in



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more than one plane, due to the varying degree of *refraction* of different *wavelengths* of light.

**Acmiola.** The trade name given to a particular make of film viewing machine used in *editing*.

**A.C.T.T.** Abbreviation for *Association of Cinematograph, Television and Allied Technicians*.

**Actinic light.** That band of the *spectrum* that produces the greatest effect on a sensitive reactor. In relation to photographic *emulsions* and television camera tubes, this is usually ultra-violet, blue-violet and blue.

**Action.** The movement that takes place in front of film cameras. Also, the executive word of command given by a *film director* for action to commence.

**Actual sound.** *Sound* coming from a visible source, such as an actor appearing on the screen using visible or implied lip movements.

**Actuality.** The recording of a *scene* as it exists in reality; i.e. "newsreel" type *shots*.

**Adaptation.** The alteration of *sound* or vision material to make it more suitable for film presentation.

**Aeolight.** A.S.A. Z24.1-1951 8.230. An Aeolight is a glow lamp employing a cold cathode and a mixture of permanent gases in which the intensity of *illumination* varies with the applied *signal voltage*.

**After glow.** The term "after glow" is applied to the emission of *light* from a *lamp* after external activation has ceased.

**A.M.** Abbreviation for *Amplitude Modulation*.

**Ambient light.** That level of *illumination* prevailing around and beyond the centre of interest. Thus, the general level of *illumination* around the screen during the viewing of a film. The greater the ambient light level, the lower is the apparent *contrast* of the *image* viewed.

**Amplitude.** The amplitude of a quantity is the difference between the extreme of that quantity and its related reference level.

**Amplitude modulation.** Abbreviated to *A.M.* The method whereby the *amplitude* of a *carrier wave* is controlled by another waveform; corresponding to the *sound waves* affecting a *microphone*.

**Angle of incidence.** The angle between a *light ray* meeting a surface and the *normal* to the surface at that point.

**Angle of refraction.** The angle between a *light ray* after *refraction* at a surface and the *normal* to the surface at that point.

**Angle shot.** Any *shot* in which the camera *lens panel* is not parallel with the main subject matter, either vertically or horizontally.

**Angström unit.** Abbreviated to *A.U.* One ten millionth part of a millimetre. This is the unit of measurement for the *wavelengths* of *light*.

**Animation.** The filming of puppets, drawings and other static material in single *shots* by *stop motion*, so that the appearance of movement is given when the film is projected at normal speed.



**Animation Cell.** An animation drawing used in the preparation of *cells* and other artwork for film animation.

**Animation camera.** A camera used for *single shot stop motion* filming and usually mounted on a vertical *animation stand*, or a horizontal bench.

**Animation stand.** Otherwise, animation bench. A stand on which a *single shot animation camera* can be mounted for the filming of static material by *stop motion*.

**Animator.** A senior *animation artist* responsible for the creation and preparation of the key *sequences* in an animated film.

**Answer print.** Otherwise *Trial Print*. This is the first complete *print* delivered by the film *laboratory* and it is used as a check on continuity and *sound synchronization*.

**Antihalation layer.** The layer interposed between the *emulsion* and *base* of film in order to prevent excessive *halation*. In some films the effect is achieved by tinting the *base* grey.

**Antinoise microphone.** A.S.A. Z24. 1-1951 10.120. An antinoise microphone is a *microphone* with characteristics which discriminate against acoustic *noise*.

**Aperture.** An opening or gap. When used without any qualification, it usually refers to the *diaphragm* opening in a *lens*. The size of the aperture (or *stop*) is expressed by a number preceded by the letter "f" or "T". (See *f-Number* and *T-Stop*.)

**Arc light.** A high intensity *light* created by the discharge of electricity between two electrodes. Carbon arc lamps, using carbon rods as the electrodes,

used in film-making for many years, but these are now being replaced by enclosed *gas arc* and high power *incandescent* lamps. However, the cry, "Save the arcs!", is still used to indicate that because of some delay, the high powered lamps can be turned out, or their current supply reduced.

**Art Director.** The person responsible for supervising the design and construction of the studio *set* and possibly, the costumes. In a small *production unit*, the art director is often the designer also.

**A.S.F.P.** Abbreviation for *Association of Specialized Film Producers Ltd.*

**Aspect ratio.** The ratio between the width and height of a picture *frame*. The basic standard for films is 4 units wide and 3 units high, although many new ratios are now being used for the various wide-screen systems.

**Assemble.** The first process in film *editing*, in which the *shots* to be used are joined together in the right order to produce the *rough cut*.

**Association of Cinematograph, Television and Allied Technicians.** Abbreviated to *A.C.T.T.* A trade union affiliated to the Trades Union Congress, which organizes all technicians employed in television and in feature, shorts and newsreel films, processing laboratories and *raw stock* manufacturing concerns. Negotiates with all the appropriate employers' associations; publishes "The Cine Technician" monthly and operates the A.C.T.T. Employment Bureau, the only agency for film technicians licensed by the L.C.C.

**Association of Specialised Film Producers.** Abbreviated to *A.S.F.P.* The



representative organization of non-feature film producers, which performs all the functions of a trade association, including negotiations with employed staff unions.

**Astigmatism.** In a *lens*, this is an aberration which shows itself as the inability to *focus* vertical and horizontal lines in the same plane at the same time. This fault is greatest in lenses of wide maximum *aperture*, but those of modern manufacture are normally corrected for this aberration and are termed "anastigmats".

**A.U.** Abbreviation for *Angström Unit*.

**Audience research.** The study of audiences in relation to their quantity, quality and behaviour patterns.

**Audio.** The word used to indicate any *sound* or recording of *sound* within the range of the human ear. In cinematography, it is often used without qualification to mean the *sound* part of a film.

**Audio frequency.** A.S.A. Z24.1-1951 1.200. An audio frequency is any *frequency* corresponding to a normally audible *sound wave*.

Note 1. Audio frequencies range roughly from 15 to 20,000 cycles per second.

Note 2. The word "audio" may be used as a modifier to indicate a device or system intended to operate at audio frequencies, e.g., "Audio amplifier".

**Audiometer.** A.S.A. Z24.1-1951 10.320. An audiometer is an instrument for measuring hearing acuity. Measurements may be made with speech signals, usually recorded, or with tone signals.

**Audio spectrum.** See *Spectrum*.

**Audition.** A live, film or recorded test of performers or material, in order to decide who or what should be included in the actual *production*.

**Authors' Society.** See *Society of Authors*.

**Autocue.** The trade name for a machine that exhibits the *script* printed in large letters to the *performers* during a *production*. The words appear on continuously moving rolls of paper mounted in frames and can be viewed both directly and by reflection. A number of machines can be connected and run in synchronism, so that the *performers* are always able to keep the *script* in sight. (See *Teleprompter* also.)

**Azimuth adjustment.** In order to play *magnetic tapes* on machines other than those on which they are recorded, the record/replay heads must be set to a standard alignment. This setting of the heads is termed azimuth adjustment.

**Background.** The *scenery*, dialogue or *sound effect* that is used as subsidiary matter in creating the desired effect in any *production*.

**Background noise.** A.S.A. Z.24.1-1951 8.065. In recording and reproducing, background noise is the total system *noise* independent of whether or not a *signal* is present. The *signal* is not to be included as part of the *noise*.

**Back lighting.** The *lighting* of any *subject* from behind, when viewed from the camera position. As this is increased in proportion to other *lighting*, the limit is reached by the production of a *silhouette*. Back-lighting is very useful for creating



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**highlights**, but care has to be taken that the *light rays* do not fall directly on to the *lens*. This causes *flare* and can be avoided to a great extent by the fitting of a *lens hood*.

**Back projection.** Otherwise *Process Projection*. The projection of a moving film or still *slide* on to the rear of a *translucent screen* used as the *background* to a *set*.

**Baffle.** A.S.A. Z24.1-1951 10.325. A baffle is a shielding structure or partition used to increase the effective length of the external transmission path between two points in an acoustic system as, for example, between the front and back of an *electroacoustic transducer*.

Note. In the case of a *loudspeaker*, a baffle is often used to increase the acoustic loading of the diaphragm.

**Balance.** The placing of *microphones*, the arrangement of *props* and/or *performers* and others, so as to achieve the desired blending of sight and/or sound.

**Band.** A group of *frequencies* between stated limits.

**Bandwidth.** The difference between two limiting *frequencies* required for the effective transmission of a *signal* containing specified information.

**Bank.** (1) A number of *lamps* grouped together, usually to provide powerful even *illumination* over a relatively large area.

(2) A number of electrical resistances operating simultaneously through mechanical linkage, as with stage *lighting* dimmer circuits.

**Barn-doors.** Adjustable flaps fitted to the front of a *lighting* unit, in order

to control the spread of the *light beam*.

**Base.** The material on which the *light sensitive emulsion of film* is coated. In Britain and the U.S.A., all *film* is now made with slow burning *safety base*, i.e., *cellulose acetate*, or *cellulose triacetate*.

**Batten.** A strip or cradle of metal or wood, used for holding *lighting* units or *scenery* in position.

**B.C.U.** Abbreviation for *Big Close-up*.

**Beats.** A.S.A. Z24.1-1951 1.215. Beats are periodic variations that result from the superimposition of *waves* having different *frequencies*.

**Bel.** A.S.A. Z24.1-1951 1.280. The bel is a dimensionless unit for expressing the ratio of two values of power, the number of bels being the logarithm to the base 10 of the power ratio.

**B.F.A.** Abbreviation for *British Film Academy*.

**B.F.P.A.** Abbreviation for *British Film Producers' Association*.

**Bias.** A steady high frequency electrical current added to a *signal* in sound recording to eliminate distortion on *playback*.

**Bidirectional microphone.** A.S.A. Z24.1-1951 10.055. A bidirectional microphone is a *microphone* in which the response predominates for sound incidences of 0 degrees and 180 degrees.

**Big close-up.** Abbreviated to *B.C.U.* A *shot* made with the camera so placed that only one main feature of the *subject* is shown. In relation to a person, this would be a *shot* of the face alone, or part thereof.

**Bilateral-area track.** A.S.A. Z24.1-1951



**8.290.** A bilateral-area track is a *sound track* having the two edges of the central area modulated according to the *signal*.

**Billing.** In the theatrical sense, this means the *credits* given to those engaged in a *production*.

**Binaural.** Appertaining to two ears. The word is frequently used in sound recording in reference to stereophonic systems in which the input of two separate groups of *microphones* are played back through two separate *loudspeakers*. The *loudspeakers* are displaced to the left and right of the listener in order that the conditions of direct sound are reproduced in part.

**B.K.S.** Abbreviation for *British Kinetograph Society*.

**Blackbody.** A.S.A. Z7.1-1942 10.055. A blackbody is a temperature radiator of uniform temperature whose *radiant flux* in all parts of the *spectrum* is the maximum obtainable from any temperature radiator at the same temperature. Such a radiator is called a blackbody, because it will absorb all the *radiant energy* that falls upon it. All other temperature radiators may be classed as non-blackbodies. They radiate less in some or all *wavelength* intervals than a blackbody of the same size and the same temperature.

The blackbody is practically realized in the form of a cavity with opaque walls at uniform temperature and with a small opening for observation purposes. It is variously called standard radiator, complete radiator, or ideal radiator.

**Blimp.** The soundproof cover used on a film camera, to prevent the noise of its mechanism being heard externally during *sound recording*.

**Bloop.** The opaque patch fitted or painted on to a *splice* on a *sound track*, in order to prevent a jump in the reproduced *sound*. A bloop patch may also be painted on a *positive sound track* for *dubbing*, or on a *projection print* (as an emergency measure) to delete an unwanted section.

**Blooming ink.** The ink used to paint a *sound track* in blooming.

**Bloop light.** The device used for exposing a spot on the *sound track* of undeveloped film for *synchronization*, or to disguise a *splice*.

**Blow-up.** The term used to describe both the process and the final *print*, when a small *gauge* film is enlarged optically to produce a larger *gauge* copy. In photography, the term also means a paper print larger than the original *negative*; thus, a paper enlargement from a motion picture *negative*.

**Blur-pan.** The fast *panning* of a camera during *shooting*, so that the *subject* is shown blurred on projection.

**Boom.** A long arm used for the support of a camera or a *microphone* and allowing placement within the limits of the boom's range of movements. A camera boom is usually referred to as a *camera crane*. (See *Microphone boom* also.)

**Breakdown.** (1) The financial analysis of a *script* for production purposes.

(2) The re-writing of a *script* in terms of logical *scenes*, or sections using the same camera or *camera angle*.

**Bridging shot.** A *shot* put between two others in order to bridge a break in time or *continuity*.



**Brightness.** C.C.S. Ag 27.1.1942. 05.1075. **Brightness** is the *luminous intensity* of any surface in a given direction per unit of projected area of the surface as viewed from that direction.

In common usage, the term brightness usually refers to the intensity of sensation which results from viewing surfaces or spaces from which *light* comes to the eye. This sensation is determined in part by the definitely measureable "brightness" defined above and in part by conditions of observation, such as the state of adaptation of the eye.

(Mathematical section excluded.)

**Brightness ratio.** A.S.A. Z7.1-1942. 05.090. **Brightness ratio** is the ratio of the brightnesses of any two surfaces. When the two surfaces are adjacent, the brightness ratio is commonly called the "brightness contrast".

**Brightness units.** See *Units of Brightness*.

**British Actors' Equity Association.** Abbreviated to *Equity*. The recognized trade union for all artistes, stage managers and producers working in the theatre, B.B.C., films or tv. The Association is a party to negotiated contracts covering every field of the entertainment industry. Affiliated to the Trades Union Congress, the Federation of Theatre Unions, and the Film Industry Employees' Council, the Association plays an important part in advising the authorities on all matters affecting theatrical artistes.

**British Documentary.** The trade association for all those concerned in the production of *documentary* films.

**British Film Association.** Abbreviated to *B.F.A.* The organisation founded by the film-makers of the United Kingdom for the advancement of the art and technique of the film.

**British Film Institute.** The Institute encourages the development of the art of the film, promotes its use as a record of contemporary life and manners and fosters public appreciation and study of the film from these points of view. The Institute acts as a repository of a history of British filming through the *National Film Library* and supports the foundation of a museum to contain material of interest to students of British film practice. The Institute acts as a clearing house for information relating to the production, distribution and exhibition of films and as a liaison between the trade, cultural and educational interests. The Institute also operates the *National Film Theatre*.

**British Film Producers' Association.** Abbreviated to *B.F.P.A.* The trade association of the producers of films in the United Kingdom. Protects and assists members in all ways affecting them as film producers and/or film studio owners; enters into agreements and/or undertakings on their behalf; appoints representatives on councils, panels, deputations and other bodies; provides for consideration and settlement of all matters affecting the film production industry and promotes the industry's interests in Great Britain and overseas.

**British Kinematograph Society.** Abbreviated to *B.K.S.* The Society is a learned body formed to encourage and further the scientific and technical aspects of cinematography and its



CC-0. Agamnigam Digital Presevation Foundation, Chandigarh allied arts and sciences. Membership is open to all those engaged in the production or use of cine films and Corporate Members are granted the use of the letters MBKS, and Fellows, FBKS. There are four specialist divisions devoted to film production, 16 mm. film, the theatre and television.

**British Screen and Television Writers' Association.** Original name of *Television and Screenwriters Guild*.

**British Sound Recording Association.** An association formed to provide various joint facilities for professionals and amateurs, engaged or interested in the art and science of *sound recording*.

**Broad.** See *Bank*.

**Broadcasting.** The transmission of picture and/or *sound signals* through the ether, such that they are capable of being received and converted into the correct visual and aural information by suitable receiving apparatus that is not connected directly with the transmitting station.

**Bulb.** See *Filament Lamp, Electric*.

**Bulk eraser.** A device designed to pass a high intensity alternating current through wound reels of *magnetic tape* such that the recorded magnetic patterns are completely erased in a matter of seconds. Because of its efficiency, this type of eraser is generally preferred by professional users to the recorder erase head.

**Busy.** (1) Any *background, scene* or item that has so many crowded shapes or tones that the effect is displeasing and causes the eye to be distracted from the main *subject*.

(2) Any *sound* or combination of

*sounds* that causes aural confusion and so detracts from the main *sound*.

**Call.** The time at which all those concerned with a *production* should attend for rehearsal, filming, or recording.

**Call sheet.** The itemised schedule of calls for performers and production personnel.

**Camera angle.** Otherwise *Viewpoint*. The angle subtended at the *lens* by the main *subject* in the picture area. Alternatively, the relative position of the camera when compared with an eye-level view at a normal distance. In this latter context, the viewpoint is said to be high, low, near, or distant.

**Camera boom.** A *boom* supporting a camera and enabling it to be placed wherever required in relation to the *set*. Such a *boom* is usually part of a *camera crane*.

**Camera crane.** A large camera platform, usually having the camera mounted at the end of an extensible arm that is power operated and permitting the camera to be moved smoothly into any position in relation to the *set* during *shooting*.

**Camera crew.** The group led by the *first cameraman* who are responsible for the recording of the picture in filming.

**Cameraman.** There are five grades concerned with camera operation in filming.

(1) **FIRST CAMERAMAN.** Otherwise *Director of Photography*. The first cameraman directs the movement of the cameras, the setting of their controls and the *lighting* of the *set*.

(2) **SECOND CAMERAMAN.** Otherwise



~~Cameo~~ ~~CC-00~~ ~~Aggravation~~ ~~The Digital Post~~ ~~Elevation Foundation~~ ~~Chantier~~ the same as cameraman acts on the instructions of the first cameraman and actually manipulates the camera.

- (3) FIRST ASSISTANT CAMERAMAN. Otherwise *Focus Puller*. The first assistant cameraman keeps the camera in focus during *shooting* and generally acts as assistant to the second cameraman.
- (4) SECOND ASSISTANT CAMERAMAN. The second assistant cameraman may act as the *loading boy*, *clapper boy*, or in any other manner as assistant to the other members of the *camera crew*.
- (5) STILL CAMERAMAN. The still cameraman takes such still photographs as are required for publicity and production purposes.

**Camera operator.** The technician who manipulates the film camera during *shooting*.

**Camera opticals.** These are *special effects* that can be made on the camera during filming, as well as on the *optical printer* in the *laboratory*.

**Camera rehearsal.** Otherwise *Run Through*.

A rehearsal making use of cameras in the same manner as intended for the actual *production*. In filming it is usual to rehearse some or all *shots* in this manner immediately prior to *shooting*.

**Camera set-up.** The immediate location of a camera in relation to the *set*.

**Camera synchronism.** A.S.A. Z22.56-1947 1.5.3. Camera synchronism is the relationship between picture and sound on an original *composite negative*.

Note. Camera synchronism is generally not the same as *projection*

**Camera tracks.** Runways of wood or metal used in filming to ensure smooth movement of the camera *dolly* during forward or reverse motion whilst *shooting* is in progress.

**Camera truck.** A large camera *dolly*.

**Candle.** The unit of measurement of *luminous intensity*. There are a number of reference levels for calculation of a *standard candle* and these are virtually identical with each other by comparison with the internationally agreed standard of the *international candle*.

**Candlepower.** A.S.A. Z7. 1-1942 05.030. Candlepower is *luminous intensity* expressed in candles.

**Candlepower, Apparent.** A.S.A. Z7.1-1942 25.065. The apparent candlepower of an extended source of *light* measured at a specified distance, is the *candlepower* of a point source of *light* which would produce the same *illumination* at that distance.

**Candlepower, Spherical.** A.S.A. Z7. 1-1942 25.045. The (mean) spherical candlepower of a *lamp* is the average *candlepower* of the *lamp* in all directions in space. It is equal to the total *luminous flux* in *lumens* divided by  $4\pi$ .

**Canned.** Recorded picture or *sound* material. Also descriptive of music coming from a recording rather than a live performance.

**Capacitor loudspeaker.** See *Electrostatic Loudspeaker*.

**Capacitor microphone.** See *Electrostatic Microphone*.



**Capstan.** In magnetic tape recording, this is the motor-controlled spindle surmounted by a roller which grips the tape and draws it past the *sound head* at constant speed.

**Carbon microphone.** A.S.A. Z24. 1-1951 10.065. A carbon microphone is a *microphone* which depends for its operation upon the variation in resistance of carbon contacts.

**Carrier wave.** A continuous *electromagnetic wave* that is modulated to carry electrical information for transmission and later reproduction in another form.

**Casting director.** The member of a *production unit* who keeps records of artistes and arranges auditions of suitable persons, as required by the *producer*.

**Cathode-ray tube.** A tube in which an *electron beam*, emanating from the cathode, is projected on to a fluorescent screen to reproduce a trace or *image*.

**C.C.I.R.** Abbreviation for Comité Consultatif International des Radiocommunications. The international body that publishes a specification for recording characteristics, generally accepted as the standard in most countries other than the United States. Because of this standard, tapes are interchangeable between all C.C.I.R. specification machines without loss of quality.

**Cell.** (1) A transparent sheet of celluloid carrying opaque matter and intended for use in *animation* or titling photography. It is common for a number of cells to be used together in superimposition and they bear punched holes to ensure correct location on

the pins of the *animation stand* base-board.

(2) Abbreviation for *photo-electric cell*.

(3) One unit of an accumulator battery.

**Cellulose acetate base.** Otherwise *Acetate*. A slow burning safety film *base*.

**Cellulose nitrate base.** Otherwise *Nitrate*. Highly inflammable *film base*, No longer being manufactured.

**Cellulose tri-acetate base.** A safety *film base* developed from *cellulose acetate base* and loosely called *acetate*.

**Channel.** (1) A *band of frequencies* used for the transmission of *sound* information and assigned a channel number to facilitate isolation in reception by the pre-setting of the tuning mechanism.

(2) The word "channel" is used loosely to mean a complete sound recording mechanism.

**Character.** An artiste who can imitate specific types and dialects and give good characterization in a performance.

**Character juvenile.** A *character* artiste of juvenile voice and appearance.

**Character ingenue.** A *character* artiste of youthful voice and appearance.

**Characteristic curve.** A characteristic curve is a curve expressing a relationship between two variables.

**Cheat.** (1) The acting technique, in which the *performer* positions himself relative to other *performers* and objects, so as to improve perspective in the filmed *scene*.

(2) The technique of positioning a



camera so that the reproduction of the *scene* shows it apparently different from reality.

**Cheat shot.** A *shot* in which the recorded or transmitted view differs from actuality, in that part of the *subject* is excluded. For example: An actor can be shown shooting an arrow that hits a target. In reality this *scene* consists of two separately produced *shots* joined together, the suggestion to the viewer of the film being that the actor hit the target with the arrow he discharged.

**Chemical fade.** This is the process of producing a *fade in* or *fade out* on a *negative* by reducing parts of the *image* with a chemical solution.

**Cinch marks.** Scratches on film that run vertically along the *frames* and are caused by friction when the film is moved in the direction of the scratches on being rolled tighter about the centre or *core*.

**Circle-in.** See *Iris-in*.

**Circle-out.** See *Iris-out*.

**Circle-wipe.** See *Iris-wipe*.

**Clapper boards.** A device used in filming and consisting of two boards hinged at one end, which are banged together to provide a means of obtaining *sound* and picture *synchronization* in *editing*. The clapper boards are usually joined to a *slate*.

**Clapper boy.** The member of a *camera crew* responsible for manipulating the *clapper boards*.

**Closed circuit.** In general, any terminated electrical circuit.

**Close medium shot.** Abbreviated to *C.M.S.* A *shot* midway between a

*close-up* and a *medium shot*. In relation to a person, this would include approximately from the head to between the waist and knees.

**Close-talking microphone.** A.S.A. Z24. 1-1951 10.025. A close-talking microphone is a *microphone* designed particularly for use close to the mouth of the speaker.

**Close-up.** Abbreviated to *C.U.* A *shot* that stresses only one main part of the *subject*. In relation to a person, this would show head and shoulders (or a similar sized portion) only.

**C.M.S.** See *Close medium shot*.

**Co-axial cable.** A low loss cable containing one conductor centred inside another and used for the transmission and reception of high *frequency signals*.

**Code numbers.** A series of numbers and key letters printed by film manufacturers on *negative* film at one foot intervals and used for stock identification.

**Cold Light.** The *light* provided by mercury discharge lamps and *fluorescent* tubes, which give *light* that is cold (i.e. red deficient) in nature. The *fluorescent* tubes have the advantage that they are also cold in another sense, the heat emitted being negligible by comparison with *incandescent* and *arc* lamps.

**Colour response.** The nature of the reaction of a *photo-sensitive emulsion*, electrical device, chemical or material, to varying *wavelengths of light*. This response and its consequent translation of colour into *monochrome* in filming, can be varied by the use of *filters* between the *subject* and/or *light* source and the sensitive surface.



**Colour temperature.** A.S.A. Z7. 1-1942 25.030. The colour temperature of a source of *light* is the temperature at which a *blackbody* must be operated to give a colour matching that of the source in question.

Colour temperatures are usually assignable only for sources which have a spectral distribution of energy not greatly different from that of a *blackbody*.

**Combination microphone.** A.S.A. Z24. 1-1951 10.030. A combination microphone is a *microphone* consisting of a combination of two or more similar or dissimilar microphones.

Note. Examples of combination microphones are: Two oppositely phased *pressure microphones* acting as a *gradient microphone*, and a *pressure microphone* and a *velocity microphone* acting as a *unidirectional microphone*.

**Commentative sound.** Otherwise *Voice-over*. *Sound* coming from a source not visible in the accompanying picture. An exception to this definition, are words spoken as if one is hearing the thoughts of a character appearing in the picture, the source in this instance being implied.

**Compensated track.** A *sound track* that has been altered in its characteristics, in order to improve the final sound quality. It is common practice to compensate in this manner the *sound track* of a 16 mm. *print* made from a 35 mm. *original*. (See *Squeeze Track* also.)

**Complementary colours.** Two colours of *light* which, when added together in the proper proportions, produce the sensation of white or grey. Also, two colours of dye or pigment which, when superimposed in the proper concentrations, produce a grey.

**Composite dupe negative.** A.S.A. Z22. 56-1947 2.4.2. A composite dupe negative is a *composite negative* which, after *exposure* and *processing*, produces a *dupe negative* picture and *sound track image*.

**Composite master positive.** A.S.A. Z22. 56-1947 3.4.5. A composite master positive is a *composite print* usually made for the purpose of producing composite or picture and *sound dupe negatives* which would be used for *printing release prints*.

Note. It is usually made on duplicating *raw stock* and may be in either *editorial* or *projection synchronism*.

**Composite negative.** A.S.A. Z22. 56-1947 2.4. A composite negative is a *negative film* which is exposed and processed to produce both *sound track* and picture *negative images* on the same film.

Note. The sound and picture may be in *editorial*, *projection* or *camera synchronism*, depending on the manner in which the composite negative is made and its intended use.

**Composite print.** A.S.A. Z22. 56-1947 3.4. Otherwise *Married print*. A composite print is a *positive film* having both picture and *sound track images* on the same film, which may be in *editorial* or *projection synchronism*.

**Composite shot.** Otherwise *Split screen*. The method whereby two or more separate *shots* are shown on the *screen* at the same time.

**Condenser.** (1) A simple type of *lens* used to collect *light* and concentrate it on a specific area.

(2) A piece of apparatus made to store electricity under pressure.

**Condenser loudspeaker.** See *Electrostatic Loudspeaker*.



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**Condenser microphone.** See *Electrostatic Microphone*.

**Contact printer.** A machine used for the *contact printing* of film. (See *Printer* also.)

**Contact printing.** A.S.A. Z22. 56-1947 1.8.1. Contact printing is that method of *printing* in which the *raw stock* is held in intimate contact with the film bearing the *image* to be copied.

**Continuity.** The maintenance of a continuous flow of action in a film.

**Continuity cutting.** In film *editing*, this is the assembly of *shots* in a manner designed to achieve *continuity*.

**Continuity girl.** The person responsible in a film *production unit* for taking notes regarding costumes and other details during *shooting*. This ensures that no discrepancies occur in *scenes shot* at different times, but which are to be *cut* to give the impression of *continuous action*.

**Continuity title.** A title used between *shots* to give a smooth transition in time or location.

**Continuous action.** *Action* involving no interspersed change of *scene*, time, or any important change of *viewpoint*.

**Continuous spectrum.** A.S.A. Z24. 1-1951 1.125. A continuous spectrum is the *spectrum* of a *wave* the components of which are continuously distributed over a *frequency* region.

**Contrast.** (1) In the original *subject*, contrast refers to the difference in *luminosity* between the brightest *highlight* and the darkest shadow. Normally only significant areas are considered and these are the parts of main interest.

(2) In a *negative* or *print*, the term is used to indicate the degree of difference between the greatest and least *image* densities. Contrast must not be confused with *gamma*.

**Contrasty.** Having high *contrast*.

**Control track.** A.S.A. Z24. 1-1951 8.260. A control track is a supplementary *sound track*, usually placed on the same film with the *sound track* carrying the programme material. Its purpose is to control, in some respect, the reproduction of the *sound track*. Ordinarily, it contains one or more tones, each of which may be modulated either as to *amplitude* or *frequency*.

**Core.** (1) A cylindrical centre (usually of tennite), on which film *raw stock* is wound. It is common practice for *prints* to be sent from the *laboratories* wound on cores and they are normally stored in this way, until required for projection.

(2) A core, in mechanical recording, is the central layer or basic support of certain types of laminated media.

**C.P.S.** Abbreviation for *cycles* per second.

**Crane shot.** A *shot* taken with a camera mounted on a *camera crane*.

**Crawl title machine.** Otherwise *Moving title machine*. A machine in which *titles* or other drawn material can be moved in front of a camera on a continuous roll of paper.

**Credits.** The *titles* placed at the beginning or end of a film, listing the names of the *performers*, technicians and others concerned with its creation and execution.

**Credit titles.** See *Credits*.



**Cross-cut.** (1) The technique used in *editing*, resulting in *shots* from two or more *scenes* being shown alternately in the final *print*.

(2) The alternate use of material from two directly opposed camera positions.

**Cross lighting.** *Lighting* coming from the side of the *set* or *scene*. When cross lighting is used on textured material at a low angle to its surface, the texture is made more apparent.

**Crystal loudspeaker (Piezoelectric loudspeaker).** A.S.A. Z24. 1-1951 10.185. A crystal loudspeaker is a *loudspeaker* in which the mechanical displacements are produced by piezoelectric action.

**Crystal Microphone (Piezoelectric microphone).** A.S.A. Z24. 1-1951 10.075. A crystal microphone is a *microphone* which depends for its operation on the generation of an electric charge by the deformation of a body (usually crystalline) having piezoelectric properties.

C.U. See *Close-up*.

**Cue.** (1) The signal given aurally or visually for some *action* or *sound* to commence.

(2) The signal given by white spots in the top right hand corner of a projected film picture for the change-over mechanism of the projectors to be operated, to ensure smooth continuous running in a feature length film.

**Cue sheet.** The complete schedule of *cues* for a film *production*.

**Cut!** The executive word of command given by a film *director*, for *action* to cease together with the operation of any picture and *sound* recording apparatus that is running.

**Cut-in.** See *Insert*.

**Cutout.** In *animation* filming, cutout figures can be made from paper or other materials for use in *stop frame animation*.

**Cuts.** The parts of a film *script* or recorded material that have been deleted and will not be included in the final *release print* or recording.

**Cutter.** (1) The technician who performs the mechanical operations in film *editing*. In practice, the *film editor* is often the cutter in small units and specialist cutters use a prefix, such as *sound cutter*.

(2) A.S.A. Z24. 1-1951 8.410. (**Mechanical recording head**). A cutter is an electromechanical *transducer* which transforms an electrical input into a mechanical output, typified by mechanical motions which may be inscribed into a recording medium by a *cutting stylus*.

**Cutting.** The separating and joining together of film *shots* to produce the final sequence as exhibited in the *release print*. (See *Editing*.)

**Cutting print.** The *positive* copy of a film on which the *film editor* and his assistants work to produce the sequence of *shots* required for the *release print*. (See *Picture Work Print* and *Sound Work Print*.)

**Cutting stylus.** A.S.A. Z24. 1-1951 8.490. A cutting stylus is a recording stylus with a sharpened tip which, by removing material, cuts a groove into the recording medium.

**Cycle.** A.S.A. Z24. 1-1951 1.055. A cycle is the complete sequence of values of a periodic quantity which occur during a period.



**Dailies.** See *Order of Release*. *Ordnance* Digital Preservation Foundation, Chandigarh

**Dead mike.** A *microphone* that is not in live electrical contact with its associated amplifying apparatus.

**Dead room.** A.S.A. Z24. 1-1951 7.045. A dead room is a room which is characterized by an unusually large amount of *sound* absorption.

**Decibel (db).** A.S.A. Z24. 1-1951 1.285. The decibel is one-tenth of a *bel*. The abbreviation "db" is commonly used for the term decibel.

**Definition.** Otherwise *Resolution*. The fidelity with which the detail of a *scene* or *image* before a film camera can be reproduced.

**Defocussing dissolve.** The *dissolve* technique whereby the *image* goes out of *focus* on one *scene* and shows another *scene* as the picture becomes sharp again.

**Degradation.** The degree to which the quality of the film *image* at any stage is inferior to the original *scene*, or to the *image* at some previous stage.

**Demodulation.** The process of extracting information from a modulated *carrier wave*.

**Densitometer.** A.S.A. Z24. 1-1951 8.340. A densitometer is an instrument for the measurement of optical *density* (photographic transmission, photographic reflection, visual transmission, etc.) of a material.

**Density.** The logarithm to base 10 of the *opacity* of a film *image*.

**Depth of field.** The distance about the point on which a camera *lens* is focussed, within which the *subject* may move in depth and remain in *focus*. This depth is usually stated as (y-x)

feet, from x feet to y feet in front of the *lens*. The depth of field may be varied by altering the *aperture*, *focal length* and/or distance setting of the *lens*.

**Depth of focus.** This term is often used in error as a synonym for *depth of field*. Depth of focus is the range of *lens* movement that is possible before the *image* becomes unsharp with reference to some acceptable standard.

**Development.** The first stage of film *processing*, in which a developing agent is used to make the *latent image* in the exposed *emulsion* visible.

**Diaphragm.** Otherwise *Iris*. The diaphragm consists of thin metal plates and forms an adjustable opening in a *lens*. This device controls the amount of *light* passing through the *lens* and in this it is similar in its action to the iris of the human eye. (See *Aperture*.)

**Differential focus.** The use of this facility of a *lens*, enables the main *subject* to be shown in sharp *focus* against an *out-of-focus background*.

**Diffraction.** When a beam of *light* passes through an aperture, or past the edge of an opaque obstacle, patterns of light and dark or coloured bands are observed near the edges of the beam and extending into the geometrical shadow. This effect is caused by the *wave* nature of *light* and is known as diffraction.

**Diffused illumination.** A.S.A. Z7. 1-1942 35.015. Diffused illumination is that produced by either primary or secondary *light* sources having dimensions relatively large with respect to the distance from the point illuminated, and emitting or scattering *light* in all directions. It is characterized by relative lack of shadow. Diffused



illumination may be derived principally from a single direction as in the *light* from a skylit window, or from all directions as in the open air.

In any practical case of *illumination* on a surface, there is usually a mixture of the above types.

**Diffuse reflection.** A.S.A. Z7. 1-1942 30.085. Diffuse reflection is that in which the *light* is reflected in all directions.

Note. The reflection from a body may be regular, diffuse or mixed. In most practical cases there is a superimposition of regular and diffuse reflection.

**Diffuse reflection factor.** The diffuse reflection factor of a body is the ratio of the diffusely reflected *light* to the *light* falling upon it.

**Diffuse sound.** A.S.A. Z24. 1-1951 1.195. Diffuse sound in a given region is *sound* which has uniform energy density and is such that all directions of energy flux at all parts of the region are equally probable.

**Diffuse transmission.** A.S.A. Z7. 1-1942 30.105. Diffuse transmission is that in which the transmitted *light* is emitted in all directions from the transmitting body.

**Diffuse transmission density.** A.S.A. Z24. 1-1951 8.330. Diffuse transmission density is the value of the *photographic transmission density* obtained when the *light* flux impinges normally on the sample and all the transmitted flux is collected and measured.

**Diffuse transmission factor.** The diffuse transmission factor of a body is the ratio of the diffusely transmitted *light* to the *light* falling upon the body.

**Diffusing surfaces and media.** A.S.A. Z7. 1-1942 30.040. Diffusing surfaces and media are those which break up the *incident light* and distribute it more or less in accordance with the cosine law, as for example, rough plaster and opal glass.

**Diffusion, complete.** A.S.A. Z7. 1-1942 30.060. Complete diffusion is that in which the diffusing medium scatters the *light* incident upon it so that none is regularly reflected or transmitted and objects from which the *light* originally comes, cannot be seen sharply by the *reflected* or *transmitted light*.

**Diffusion, partial or incomplete.** A.S.A. Z7. 1-1942 30.065. Partial or incomplete diffusion is that in which the diffusing medium scatters part of the *light* incident upon it, but allows part to be regularly reflected or transmitted so that objects from which the *light* originally comes (such as the filament of a *lamp*), can be seen sharply defined by the reflected or transmitted *light*.

**Diffusion, perfect.** A.S.A. Z7. 1-1942 30.045. Perfect diffusion is that in which *light* is scattered uniformly in all directions by the diffusing medium.

This is a hypothetical case, since no medium is perfectly diffusing. A flat plate of such a diffusing medium would appear equally bright irrespective of the direction of the *incident light* or the direction from which it is observed, but on account of the foreshortening effect when the plate is observed obliquely, the *light* flux would be distributed in accordance with Lambert's cosine formula.

**Diorama.** A small *set* used in place of a much larger one, usually in order to suggest location or time.



**Directional microphone.** A.S.A. Z24. 1-1951 10.050. A directional microphone is a *microphone* the response of which varies significantly with the direction of *sound* incidence.

**Director.** The member of a film *production unit* who is in control of all *action*, *sound* and its recording when the *production* is on the *floor*. The director is responsible for the film conforming to the intentions of the *producer* and for the interpretation of the final *script*.

**Director of photography.** See *Camera-man*; *First cameraman*.

**Disc recorder.** A.S.A. Z24. 1-1951 8.385. A disc recorder is a *mechanical recorder* in which the recording medium has the geometry of a disc.

**Discharge lamp, electric.** A.S.A. Z7. 1-1942 25.015. An electric discharge lamp is a *lamp* in which *light* is produced by the passage of electricity through a metallic vapour or a gas enclosed in a tube or bulb.

**Dissolve.** Otherwise *Lap Dissolve* or *Mix*. The *optical* effect whereby one picture disappears gradually, being replaced simultaneously by another.

**Documentary.** A *production* that is concerned with the recording and interpretation of real events, with any included fictional material playing a subsidiary part.

**Dolly.** Otherwise *Velocitator*. An easily moved wheeled vehicle used to support a camera during *shooting* and often the *second cameraman* as well. The larger type of dolly is termed a *camera truck*.

**Dolly shot.** See *Dollying*.

**Dollying.** Otherwise *Tracking*, *Traveling* or *Trucking*. The moving of a camera on a *dolly* or *camera truck* during *shooting*. The commands for movement are: "Dolly-in", "Dolly-out", "Track-in", "Track-out", etc.

**Dolly pusher.** The person responsible for moving the camera *dolly* during *shooting*.

**Double exposure.** The successive *exposure* of film *raw stock* to two *scenes*, so that they appear superimposed in the developed *image*. (See *Multiple exposure*.)

**Double-headed projection.** The projection of associated but separate *sound* and picture *prints* in *synchronism*, before *marrying-up*.

**Double-system sound recording.** The film recording system whereby separate machines are used and/or separate records are made, of the picture and its associated *sound*.

**Down stage.** In filming, this direction means towards the camera.

**Dry run.** Otherwise *Walk-through*. A full rehearsal for a *production*, but without cameras.

**Dubbing.** A.S.A. Z24. 1-1951 8.085. Dubbing is a term used to describe the combining of two or more sources of *sound* into a complete recording, at least one of the sources being a recording. (See *Re-recording*.)

**Dupe (Duplicate) negative.** A.S.A. Z22. 56-1947 1.3. A dupe (duplicate) negative is a *negative* film that is produced by *printing* from a *positive*.

Note. A dupe negative is used for producing *prints* which are, in effect, duplicates of *prints* which might be made from the original *negative*.



**Duping print.** Otherwise *Fine-grain* or *Lavender*. A *positive* film copy of soft gradation, made from the original *negative* for the purpose of producing a *dupe negative*.

**Duplicated audience.** The descriptive term used for those persons who have seen a particular film screening more than once.

**Dynamic cutting.** The film *editing* technique in which dissimilar *shots* and/or *sequences* are joined together in such a manner as to give impressions in the final film that were not expressed separately in its constituent parts.

**Dynamic loudspeaker.** See *Moving-Coil Loudspeaker*.

**Dynamic microphone.** See *Moving-Coil Microphone*.

**Dynamic range.** In sound recording the ratio between the softest and loudest sounds in a given set of circumstances. The ratio is usually expressed in *dB's*.

**Dyne.** Absolute unit of force. The force which, acting upon a mass of one gram, will impart to it an acceleration of one centimetre per second per second.

**Echo.** A.S.A. Z24. 1-1951 1.255. An echo is a *wave* which has been reflected or otherwise returned with sufficient magnitude and delay to be perceived in some manner as a *wave* distinct from that directly transmitted.

**Echo chamber.** A mechanism which delays sounds for a sufficiently long period to produce an *echo* effect in the final recording.

**Edge numbers.** The numbers printed at one foot intervals along the edges of *sound* and picture *prints* in *editorial synchronism* by the editorial department. The same numbers are printed beside matching sound and picture frames and they ensure correct *synchronization* in the *cutting prints* at all stages of *editing*.

**Editing.** This term is often used as a synonym for *cutting*. Editing is the decisions taken regarding alterations needed in respect of a film *production*, in order to achieve the desired result. Editing is combined with the manual operation of *cutting* to produce the *sample print*.

**Editola.** The trade name given to a particular make of film viewing machine used in *editing*.

**Editor.** See *Film Editor*.

**Editorial synchronism.** A.S.A. Z22. 56-1947 1.5.2. Editorial synchronism is the relationship between the picture and *sound* film during the editorial process.

Note. During the editorial process, the *sound track* and corresponding picture, whether on the same or separate films, are kept in alignment and not offset as for projection. Thus, *cutting*, a picture and *sound* can be a simultaneous operation. Many composite release negatives are supplied in editorial synchronism.

**Effect filter.** A *filter* used to obtain an exaggerated effect. For example: if a deep red *filter* is used with *panchromatic* film, blue *light* is almost completely absorbed and so a deep blue sky will appear as black in the final *print*. In such a case, the general effect is one of night.



**Efficiency.** A.S.A. Z24. 1-1951 1.455. The efficiency of a device with respect to a physical quantity which may be stored, transferred, or transformed by the device, is the ratio of the useful output of the quantity to its total input.

Note. Unless specifically stated otherwise, the term "efficiency" means efficiency with respect to power.

**Efficiency (of a source of light).** A.S.A. Z7. 1-1942 25.020. The efficiency of a source is the ratio of the total *luminous flux* to the total power input. In the case of an *electric lamp* it is expressed in *lumens per watt*. In the case of a source depending upon combustion it may be expressed in *lumens per thermal unit consumed per unit of time*.

**Electric discharge lamp.** See *Discharge Lamp, Electric*.

**Electric filament lamp.** See *Filament Lamp, Electric*.

**Electroacoustic transducer.** A.S.A. Z24. 1-1951 3.070. An electroacoustic transducer is a *transducer* for receiving *waves* from an electric system and delivering *waves* to an acoustic system, or vice versa.

**Electromagnetic microphone.** See *Variable-Reluctance Microphone*.

**Electromagnetic spectrum.** See *Spectrum*.

**Electromagnetic wave.** A *wave-motion* within the *electromagnetic spectrum*.

**Electron.** A sub-atomic particle having a mass of 1/1,840 that of a hydrogen atom and bearing a negative electrical charge.

**Electron beam.** Otherwise *Cathode ray*

*beam*. *Electrons* emitted by the cathode of an *electron tube* and focussed into a beam by electrostatic or magnetic fields.

**Electron gun.** The source of the *electron beam*.

**Electronic microphone.** A.S.A. Z24. 1-1951 10.080. An electronic microphone is a *microphone* which depends for its operation on the generation of a voltage by the motion of one of the electrodes in a vacuum tube.

**Electronic puppets.** See *Kinemins*.

**Electrostatic loudspeaker (capacitor loudspeaker) (condenser loudspeaker).** A.S.A. Z24. 1-1951 10.180. An electrostatic loudspeaker is a *loudspeaker* in which the mechanical forces are produced by the action of electrostatic fields.

**Electrostatic microphone (capacitor microphone) (condenser microphone).** A.S.A. Z24. 1-1951 10.070. An electrostatic microphone is a *microphone* which depends for its operation upon variations of its electrostatic capacitance.

**Emissivity, spectral.** See *Spectral Emissivity*.

**Emissivity, total.** See *Total Emissivity*.

**Emulsion, photographic.** A.S.A. Z24. 1-1951 8.310. Photographic emulsion is the light sensitive coating on photographic film consisting usually of a gelatine containing *silver halide*.

**Emulsion speed.** See *Film Speed*.

**Equalization.** See *Frequency response equalization*.

**Equity.** Abbreviation for *British Actors' Equity Association*.



**Erasing.** In tape recording practice, this is the act of neutralizing the magnetic pattern on tape by exposing it to an intense magnetic field.

**Erasing head.** A.S.A. Z24. 1-1951 8.145. An erasing head is a device for obliterating any previous recordings on magnetic media. It may be used for preconditioning the magnetic media for recording purposes.

**Erg.** Unit of work in the centimetre-gram-second system. The work performed by a force of one *dyne* acting through a distance of one centimetre.

**Establishing shot.** This is usually a *long shot* for establishing a mood or location and so tying together the separate parts of the *scene* or *sequence*.

**Excited field loudspeaker.** A.S.A. Z24. 1-1951 10.190. An excited field loudspeaker is a *loudspeaker* in which the steady magnetic field is produced by an electromagnet.

**Exposure.** A.S.A. Z22. 56-1947 1.6. Exposure is the process of subjecting a photographic *film* to any given intensity of *light* in such a manner that it may produce a *latent image* on the *emulsion*.

**Exposure meter.** A meter used to determine the intensity of *light* at any point or defined area. There are two basic types of meter: (1) The reflected light meter, which takes readings of the *light* reflected by the *subject*, and, (2) The incident light meter, which takes readings from the *subject* position of the *light* directed upon the *subject*.

**Extra.** A person employed to take part in a crowd *scene* and who is not required to make an individual

appearance. (See *Performer* and *Walk-On* also.)

**Fade-down.** The term given to the progressive decrease in the *sound* level from a *microphone*.

**Fade-in.** The effect whereby a *shot* starts with complete darkness and the picture gradually appears, until full *image* brightness is obtained.

**Fade-out.** The effect whereby a *shot* starts with full *image* brightness and gradually fades until the screen is completely dark.

**Fade-up.** The term given to the progressive increase in the *sound* level from a *microphone*.

**Fast motion.** The filming technique whereby the appearance of fast motion in the original *subject* is obtained on projection, by *shooting* the original film at less than normal *film speed*.

**Feed back.** The high pitched *noise* caused by the wrong positioning of a *microphone* relative to an associated loudspeaker, or defects such as spurious currents in the amplifier circuit.

**Fidelity.** The degree with which the original *scene* or *sound* is accurately reproduced after recording.

**Field.** (1) In relation to a *lens*, the field is that area in the *image* plane beyond which acceptable *definition* cannot be expected.

(2) In relation to a *scene*, the field is usually termed the "field of view" and is that area covered by the camera *lens* at any moment.

**Filament lamp, electric.** A.S.A. Z7. 1-1942 25.010. An electric filament



lamp is a *light* source consisting of a glass bulb containing a filament electrically maintained at incandescence.

Note. A *lighting unit* consisting of an electric filament lamp with shade, *reflector*, enclosing globe, housing, or other accessories, is also commonly called a "*lamp*". In such cases in order to distinguish between the assembled *lighting unit* and the *light* source within it, the latter is often called a "*bulb*".

**Fill-in light.** Otherwise Filler Light or Fill Light. The secondary *lighting* used to illuminate the areas cast in shadow by the *key light*.

**Film.** The *light* sensitive material used for the recording of a photographic *image* and consisting of an *emulsion* coated on to a pliable base. The term is also taken to mean the product of cinematography.

**Film base.** See *Base*.

**Film Casting Association Ltd.** An association formed by the *British Film Producers Association* to provide film casting services to members.

**Film cement.** A solution that will partially dissolve *film base* and so enable two pieces of film to be joined together in a *splice*.

**Film Clip.** (1) A piece of film cut from a larger section, or a *library shot*.

(2) A film clip is also a device for holding short lengths of film for the purposes of *editing* or *laboratory tests*.

**Film editor.** The person in charge of the *cutting* of a film. (See *Cutter*.)

**Film gate.** The opening and guide mechanism situated behind the *lens*

and through which film passes in a camera or projector.

**Film Industry Employees' Council.** The Council serves as a consultative body and takes such appropriate joint action as may be agreed on matters of common interest to the constituent unions.

**Film Laboratory Association.** An Association of film laboratories that interests itself in all matters of concern to members, including labour relations.

**Film Library.** A collection of films, stored and indexed against their possible future use. The films are normally cut and cross referenced according to subject matter. It is usual for each production company to have its own library and most of them are willing to make their material available for use by outsiders at a charge.

**Film loop.** A length of film having its ends joined together and so able to run continuously through a *projector* or *printing machine* having a suitable adaptor.

**Film magazine.** A container for film that is effectively light-tight if intended to hold undeveloped material.

**Film perforations.** A.S.A. Z22. 56-1947 1.1.3. Film perforations are the regularly and accurately spaced holes that are punched throughout the length of motion picture film. These holes are engaged by the teeth of various sprockets and pins by which the film is propelled and positioned as it travels through cameras, *processing machines*, *projectors*, and other film machinery.

**Film speed.** (1) The rate at which film moves through a camera or *projector film gate*.



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(2) The degree of sensitivity of a film to light under controlled exposure and development conditions.

**Filter.** A coloured or neutral piece of glass or gelatine designed to fit over the camera lens and to absorb part of the light spectrum, or reduce the effective light level. (See *Wave Filter* also.)

**Final trial composite (sample print).** A.S.A. Z22. 56-1947 3.4.4. A final trial composite print (*sample print*) is a composite print approved for release, in which all corrections found necessary in previous trial composite prints have been incorporated.

Note. The final trial composite may be any one of the various trial composite prints, depending upon the type and extent of the corrections required.

**Fine cut.** In editing, this is the term used for the workprint after the rough cut has been further edited.

**Fine-grain.** (1) See *Duping Print*.

(2) A photographic emulsion that gives maximum image resolution.

**First generation dupe.** In filming, this is a reversal print made from a reversal original. When dealing with colour film it is usual to project second generation dupes made from the first generation dupe, so that the original is protected from damage.

**First trial composite print.** A.S.A. Z22. 56-1947 3.4.2. The first trial composite is the first composite print made from the picture and sound release negatives for the purpose of checking and correcting picture and sound quality, negative cutting and assembly, etc. It is in projection synchronism.

**Fixing.** A.S.A. Z22. 56-1947 1.7.1.

Fixing (fixation) is the process of removing the residual sensitive silver halides from a developed film to render the developed image permanent.

Note. During the process of fixation, films are customarily treated to preserve and harden the developed image.

**Flag.** A small gobo.

**Flare.** Flare shows itself as an irregularly shaped blemish on the film, and is caused by reflections from shiny objects, or internal camera reflections. The latter are easily overcome and the former can be avoided by dulling the offending surfaces, or altering the camera angle.

**Flash back.** A sequence which takes the action or sound back into the past relative to the rest of the story.

**Flat.** (1) As an adjective, this means a picture lacking in contrast.

(2) As a noun, the term is used for a scenery board. The word "flat" is often preceded by "two-fold", "three-fold", etc., in order to indicate the number of smaller flats hinged together to form the whole flat.

**Flat lighting.** Lighting that provides even illumination.

**Flicker.** The sensation of flicker emphasizes the discontinuous nature of cine pictures. Flicker can be avoided by increasing the number of interruptions to the projector light, so that the natural persistence of vision of the human eye can merge successive picture frames. The actual level at which flicker becomes noticeable varies according to the mean screen brightness, the viewer's eyesight and other factors. However, for all practical purposes it



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has been found that 24 frames per second is sufficient to eliminate flicker.

**Flies.** The space from the top of a *set* to the *studio* ceiling used for suspended *scenery*, *lighting* equipment and so on.

**Flipover.** Otherwise *Flipwipe*. A picture *wipe* in which the *scene* viewed appears to rotate in the picture *frame* about a horizontal or vertical axis and another *scene* appears, as if it had been on the back of the original one.

**Flipwipe.** See *Flipover*.

**Float.** A *flat*, usually of a wall, and provided to stand separate from the main *set*.

**Flood.** A *lighting unit* used to illuminate a wide area.

**Floor.** The term for the part of the *studio* area on which *action* being filmed takes place. Once filming has commenced, a *production* is said to be, "on the floor".

**Fluorescent light.** The *illumination* obtained from a *lamp* containing mercury vapour at low pressure and coated on its inner surface with a suitable fluorescing substance. When an electric current is passed through the *lamp*, *light* rich in blue and ultra-violet is produced. The ultra-violet radiation acts on the fluorescent coating to cause visible *light* to be emitted that is soft and even in character. The *lamp's efficiency* is very high by comparison with the *incandescent lamp* and it is also cooler in operation.

**Flutter.** (1) In cinematography, flutter is any film movement at right angles to the *image* plane during its passage through a camera or *projector*.

(2) In relation to *sound*, flutter is any deviation in *frequency* resulting

from irregular motion in the recording, duplication or reproduction of a tone, or from deformation of the record. (See *Wow* also.)

**Flux, luminous.** See *Luminous Flux*.

**Flux, radiant.** See *Radiant Flux*.

**Flux, total.** See *Total Flux*.

**Flux, density.** See *Radiant Flux Density*.

**F.M.** Abbreviation for *Frequency Modulation*.

**f-number.** A number indicating the relative size of the *aperture* of a *lens* and hence its *light* transmission power. A *lens* of high speed has a large *aperture* and a low f-number. This is shown by the formula:

$$\text{f-number} = \frac{\text{Focal length of the lens}}{\text{Effective aperture of the lens.}}$$

In a simple *lens*, the effective *aperture* is roughly the same as the diameter of the *lens aperture*. (See *T-Stop* also.)

**Focal length.** The distance from the optical centre of a *lens* to the point where it brings to sharp *focus* an object placed at an infinite distance. The focal length is stated in inches or centimetres and is usually engraved on the *lens* mount with the prefix "F". The scale of reproduction of an *image* of a *scene* increases proportionally with the focal length of the *lens*.

**Focus.** In relation to a *lens*, this is the plane at right angles to the optical axis, at which the *image* attains maximum *definition*. If the sensitive surface of the recording medium is not in this plane, the *image* will be *out-of-focus*. (See *Depth of Focus*.)

**Focus puller.** See *Cameraman: First Assistant*.

**Focussing board.** A board bearing



suitable inscriptions that is used for checking the *focus* of a camera.

**Fog density.** Otherwise *Fog Level*. The photographic *density* appearing on unexposed film after *development*. This is normally due to chemical fog produced in *processing*, the *density* of the *base* and any colouring matter introduced as an anti-halation backing. Fog may also occur because of internally reflected *light* in the camera, *flare* from the camera *lens*, or ageing of the *raw stock*.

**Fogging.** Photographic *density* appearing on film by reason of the action of extraneous *light*, or unwanted chemical reaction, prior to the completion of *processing*.

**Fog level.** See *Fog Density*.

**Follow focus.** When the relative positions of the camera and the *subject* vary during *shooting* so that the *subject* moves out of the *depth of field*, the *lens* setting must be altered to ensure that the *image* is in sharp *focus*. This operation is known as "follow focus".

**Follow shot.** A *shot* in which the camera follows the *action* as it moves.

**Footage.** The length of film in a piece that has been used, or can be used.

**Foot candle.** A.S.A. Z7. 1-1942 05.040. The foot-candle (ft.-c) is the unit of *illumination* when the foot is taken as the unit of length. It is the *illumination* on a surface one square foot in area on which there is a uniformly distributed flux of one *lumen*, or the illumination produced at a surface all points of which are at a distance of one foot from a uniform *point source* of one candle.

**Footlambert.** A.S.A. Z7. 1-1942 05.085.

Abbreviated to ft.-L. The footlambert is a unit of *brightness* equal to  $1/\pi$  candle per square foot, or to the uniform *brightness* of a perfectly diffusing surface emitting or reflecting *light* at the rate of one *lumen* per square foot, or to the average *brightness* of any surface emitting or reflecting *light* at that rate.

Note. The average *brightness* of any reflecting surface in footlamberts is, therefore, the product of the *illumination* in *footcandles* by the reflection factor of the surface. The footlambert is the same as the "apparent foot-candle".

**Foreign release.** A foreign release is any *release* made to agencies outside the country of origin. A descriptive prefix is usually added to indicate the country or territory for which the *release* is intended; e.g., "Spanish Release" for one intended for a Spanish-speaking territory.

**Frame.** A complete individual picture in a film.

- (1) TO FRAME. The act of adjusting the relevant mechanism, so that the area of a film *frame* coincides exactly with the *aperture* in a *film gate*.
- (2) FRAME LINES. The dividing non-picture bands between successive film *frames*.
- (3) IN-FRAME. This is said of the *image* viewed when it is correctly framed, so that the *frame lines* are not seen.
- (4) OUT-OF-FRAME. This is said of the *image* viewed when it is incorrectly framed, so that the *frame lines* can be seen.

**Free perspective.** The technique whereby converging lines and other devices are employed in *set* design to give an impression of great depth.



**Frequency.** The number of complete cycles or *wavelengths* occurring in a regular wave-motion per unit of time. Frequency can be found from the following formula and, because the normal unit of time is one second, the abbreviation "c.p.s." (cycles per second) is often used.

$$\text{Frequency} = \frac{\text{Velocity of wave-motion}}{\text{Wavelength}}$$

**Frequency modulation.** Abbreviated to *F.M.* The system of transmission of an electrical *signal*, in which the *frequency* of the *carrier wave* is caused to vary in accordance with an applied modulating *signal*. Frequency modulation differs from *amplitude modulation* in which the *carrier wave* has its *amplitude* modulated by another waveform representing the *signal*, but the *frequency* is not affected.

**Frequency range.** In sound recording, this term is normally applied to the range between the highest and lowest pitched *sounds* that a given recording system can reproduce in a usable form.

**Frequency response.** In sound recording, the output level of a given system over a given range of frequencies. This data is normally given in the form of a curve plotted with *frequency* on the horizontal and sound intensity (*dB*) on the vertical axes. Thus, when the curve is horizontal between two limiting frequencies, the response is said to be flat between those points.

**Frequency response equalization.** The compensation made in a recording system to correct any deficiencies throughout the *frequency range* in order to produce the desired intensity at each point. There is a C.C.I.R. equalization specification adopted for most *tape recorders* manufactured outside the U.S.A.

**Fringing.** Fringing is said to occur when the edges of a film *frame* appear to be ragged on projection, due to the imperfect registration of superimposed *images*. This defect is commonly found in certain types of colour *print*.

**Frontal lighting.** *Lighting* from the camera side of the *set* or *scene*. If this is the main *lighting*, the *subject* will be evenly lit and possess only that *contrast* inherent in its shape or colouration.

**F.S.** Abbreviation for *Full Shot*.

**Full shot.** Abbreviated to *F.S.* A *shot* that includes the main *subject* matter and little else.

**Full track.** In magnetic tape recording, this is a magnetic track the full width of the tape.

**Full-track recorder.** A magnetic tape recorder using a single track the full width of the tape.

**Gaffer.** The chief electrician in a film *production unit*. He is directly responsible to the *First Cameraman*.

**Gain.** The ratio of the output to input voltage, current or power in any circuit.

**Gamma.** The term gamma is used in photography and electronics to mean the relationship between the overall *contrasts* of the input and output *images*. The gamma most frequently considered in general practice is that concerned with the variation in *contrast* between the *original subject* matter and the *image* reproduced therefrom.

In photography, gamma is expressed mathematically as the tangent of the



straight line portion of a film's *characteristic curve* with the *log exposure* axis, when *density* is plotted against *log exposure*. In television, there is a similar curve for the transfer characteristics of the electronic apparatus used and a mathematical quantity assignable to gamma can be deduced from this.

If gamma is said to be unity, then the overall *contrast* in the reproduced *image* is unaltered; if it is less than unity, the overall *contrast* has been reduced, and if it is greater than unity, the overall *contrast* has been increased.

**Gap length.** A.S.A. Z24. 1-1951 8.180. In longitudinal magnetic recording, the gap length is the physical distance between adjacent surfaces of the pole pieces of a *magnetic head*.

Note. The effective gap length is usually greater than the physical length and can be determined experimentally in some cases.

**Gas arc lamp.** A continuously burning arc discharge lamp of high luminance and lumen output. The gas arc lamp is filled with a rare gas, and with Xenon its *colour temperature* is 5500°K.

**Gauge.** Ciné film is designated according to its width, 35 mm. film being said to be of "standard gauge". In addition to special gauges made for wide screen processes, the only other professional size of film, other than for magnetic recording, is 16 mm. wide and this is termed "sub-standard", or "narrow-gauge". Smaller gauge films for purely amateur use, such as 9.5 mm. and 8 mm. are named by their sizes.

**Ghost.** In film projection, a ghost is an extension above or below the main *images* on the *screen* and is caused by faulty *synchronization* between the

*shutter* and intermittent mechanisms of the *projector*.

**Gimmick.** A device used to attract attention.

**Glass shot.** A *shot* in which part of the *scenery* appears on a glass plate. This glass is either photographed separately and superimposed on the main part of the *scene* during *processing*, or it is placed between the camera and the main *set* and filmed directly.

**Gobo.** A screen placed on the *set* in order to prevent beams of *light* from shining directly into the camera *lens*. (See *Flag* also.)

**Go-to-black.** See *Fade Out*.

**Gradient microphone.** A.S.A. Z24. 1-1951 10.025. A gradient microphone is a *microphone* the output of which corresponds to a gradient of the *sound* pressure.

Note. Gradient microphones may be of any order as, for example, zero, first, second, etc. A *pressure microphone* is a gradient microphone of zero order. A *velocity microphone* is a gradient microphone of order one. (Mathematical section omitted.)

**Grading.** The process whereby the overall *density* of each *negative* film *frame* to be printed is assessed and the necessary adjustments to the *printer light* noted, in order to obtain the desired uniformity of *image* brightness in the projected *print*.

**Grain.** A.S.A. Z24. 1-1951 8.350. A grain of photographic material is a small particle of metallic silver remaining in a photographic emulsion after *development* and *fixing*. In the agglomerate, these grains form the dark areas of a photographic *image*.



**Graininess.** The extent to which an *emulsion* shows a discontinuous *image* by virtue of its inherent *grain* structure. This graininess is most apparent in light, even-toned areas of the *image*.

**Graybody.** A.S.A. Z7. 1-1942 10.070. A graybody is a *temperature radiator* whose *spectral emissivity* is less than unity and the same at all *wavelengths*.

**Green print.** A green print is a *print* that has not been through a *projector*. A green print may possibly jam in the *projector gate* on first running and *waxing* helps to prevent this happening.

**Grey scale.** A graduated range of tones extending from white to black, with intermediate greys consisting of intermixed white and black.

**Grip.** The handyman in a *production unit* who undertakes running repairs to *props*, *scenery* and equipment on the *set*.

**Groove.** A.S.A. Z24. 1-1951 8.665. A groove, in mechanical recording, is the track inscribed in the record by the cutting or embossing stylus, including undulations or modulations caused by the vibration of the stylus.

**Ground noise.** A.S.A. Z24. 1-1951 8.060. In recording and reproducing, ground noise is the residual system noise in the absence of the *signal*. It is usually caused by inhomogeneity in the recording and reproducing media, but may also include amplifier noise such as tube noise or noise generated in resistive elements in the input of the reproducer amplifier system.

**Gyro head.** A gyro head is a device fitted to the top of a camera support and designed to hold the camera

steady, whilst all *elements* be altered in angle as required. The gyro head affords great stability, because it incorporates a heavy flywheel that revolves at high speed within the head.

**Halation.** This is a halo of *light* seen to be surrounding any very bright object on a film record of a *scene*. The halo spreads into the surrounding *image* and can be avoided to a great extent by an *antihalation layer* between the *emulsion* and the film *base*. If excess *light* passes through the *emulsion* it is absorbed by the *antihalation layer* and so cannot be reflected upwards by the base to produce halation.

**Half track.** In magnetic tape recording, this is a magnetic track half the width of the tape.

**Half-track recorder.** A magnetic tape recorder using a recording head covering half the tape width, so that double the playing time is obtained with any given length of tape and speed.

**H and D curve (Hurter and Driffield curve).** A.S.A. Z24. 1-1951 8.360. An H and D curve is a *characteristic curve* of a photographic *emulsion* which is a plot of *density* against the logarithm of *exposure*. It is used for the control of photographic *processing*, and for defining the response characteristics to *light* of photographic *emulsions*.

**Hand splicer.** See *Splicer*.

**Head out.** Otherwise *Head-up*. The winding of a length of film, so that the first *frame* is on the outside and so, in the case of a *print*, it is ready for immediate projection.



**Head-up.** See *Head-out*.

**High key.** The term used when the majority of tones in the *subject* or *image* lie at the light end of the *grey scale*.

**High key lighting.** *Lighting* designed to produce a *high key* effect in the reproduced *image*.

**Highlighting.** The emphasis of a part of the *subject* matter by means of tone variation, or extra *illumination*.

**Highlights.** The parts of the *subject* emphasized by *highlighting*.

**High speed camera.** A camera in which the film is moved at very high speeds (i.e. taking up to 4,000 frames per second), so that on *projection* at the normal rate, the impression is given of very slow motion.

**Hot splicer.** See *Splicer*.

**Hot-wire microphone.** A.S.A. Z24. 1-1951 10.085. A hot-wire microphone is a *microphone* which depends for its operation on the change in resistance of a hot wire produced by the cooling or heating effects of a *sound wave*.

**Illumination.** A.S.A. Z7. 1-1942 05.035. Illumination is the density of the *luminous flux* on a surface; it is the quotient of the flux by the area of the surface when the latter is uniformly illuminated.

Note. The term illumination is also commonly used in a qualitative or general sense to designate the act of illuminating, or the state of being illuminated. Usually the context will indicate which meaning is intended, but occasionally it is desirable to use the expression "amount of illumina-

tion" to indicate that the quantitative meaning is intended. (See also *Diffused Illumination*, *Multidirectional Illumination* and *Unidirectional Illumination*.)

**Image.** The reproduction of any *subject* or *scene* in a viable form and one capable of being viewed, or translation into a form permitting viewing.

**Impedance.** A.S.A. Z24. 1-1951 2.005. An impedance is the complex ratio of a force-like quantity (force, pressure, voltage, temperature, or electric field strength) to a related velocity-like quantity (velocity, volume velocity, current, heat flow, or magnetic field strength).

Note. The terms and definitions to which this note is appended pertain to single *frequency* quantities in the steady state, and to systems whose properties are independent of the magnitudes of these quantities. These quantities can be represented mathematically by complex exponential functions of time. Under these conditions the factors involving time cancel out in the ratios called for, leaving complex numbers independent of time. Solutions based on complex exponential functions under these conditions give the solution for real sinusoidal oscillations.

Because of the similarity of electrical, mechanical, and acoustical transmission theory, the same terminology is used in the three cases. Where confusion is likely to occur, the proper term should be prefixed to the general term, e.g., acoustic transfer impedance, but unless otherwise specified the definitions apply not only in acoustics but in mechanics as well. While acoustics is a branch of mechanics, it is found convenient to dis-



tinguish an acoustic system from a mechanical one whenever elastic wave-motion is an essential feature.

While a strict application of the impedance concept implies the restrictions given above, it is common practice to extend the term "impedance" to situations involving non-sinusoidal quantities or non-linear systems. Such extensions should be accompanied by an explanatory statement.

**In betweeners.** The term sometimes used for the *animation artists* who prepare the sketches for *cells* between those of important movements, which are drawn by senior *animation artists*.

**In camera.** The part of a *set* or *scene* that is within the field of view of a particular camera at any instant.

**Incandescent light.** The *light* emanating from a *lamp* in which a filament is made luminous by the passage of electricity causing a rise in its temperature.

**Incident light.** The *light* falling upon a surface. (See *Angle of incidence*.)

**Induction loudspeaker.** A.S.A. Z24. 1-1951 10.195. An induction loudspeaker is a *loudspeaker* in which the current which reacts with the steady magnetic field is induced in the moving member.

**In focus.** An *object* or *scene* is said to be "in focus" in relation to a camera, if the camera is so set up that the *image* is reproduced with an acceptable degree of sharpness in the *image* forming plane of the camera.

**Infrasonic frequency.** A.S.A. Z24. 1-1951 1.205. An infrasonic frequency is a *frequency* lying below the *audio* frequency range.

Note. The word "infrasonic" may be used as a modifier to indicate a device or system intended to operate at infrasonic frequencies.

**Ingenué.** An actress of youthful voice and appearance.

**Inkie or Inkie-Dinkie.** A small *incandescent lighting unit* used for local *lighting*.

**In phase.** (1) In filming, this is the condition when an intermittent *shutter* of a camera, *projector*, or *printing* machine is accurately linked to the film transport mechanism, so that the film is only exposed when it is stationary.

(2) In the electrical sense, this is the condition in which the signals at all stages are in perfect step with each other.

**Insert shot.** A *shot* that is inserted in order to assist in explaining the *action*, or to provide *continuity*.

**Instantaneous recording.** A.S.A. Z24. 1-1951 8.030. An instantaneous recording is a recording which is intended for direct reproduction without further *processing*.

**Intensity.** Otherwise Specific sound-energy flux level, or sound-energy flux density level. A.S.A. Z24. 1-1951 1.375. The intensity level, in *decibels*, of a *sound* is 10 times the logarithm to the base 10 of the ratio of the intensity of this *sound* to the reference intensity. The reference intensity shall be stated explicitly.

Note. In discussing *sound* measurements made with *pressure* or *velocity* *microphones*, especially in enclosures involving normal modes of vibration or in *sound* fields containing standing *waves*, caution must be observed in



using the terms "intensity" and "intensity level". Under such conditions it is more desirable to use the terms "pressure level" or "velocity level", since the relationship between the intensity and the pressure or velocity is generally unknown.

**Intercutting.** The method of film *cutting* in which many short *shots* of the same *subject* from different angles, are joined together.

**Intermittent light.** A.S.A. Z7. 1-1942 50.015. An intermittent light is a *light* which has alternate light and dark intervals, when viewed from a fixed point.

**Intermittent movement.** The term used for the method of film transport in a camera, *projector* or *printer*, whereby the film is moved intermittently and only exposed to *light* when stationary.

**International candle.** See *Candle*.

**In-the-can.** The term often employed to indicate that a film has been exposed or completed and is literally in its travelling can, or magazine.

**Inverse square law.** A general law connecting the intensity of effect produced at any point with the distance of the point from the centre from which the influence causing the effect acts. The law applies to gravitation, the force of attraction or repulsion between electric charges or magnetic poles, the intensity of illumination of a surface, thermal radiation and sound. The intensity of the effect produced varies inversely as the square of the distance. Thus, a surface one foot away from a source of light will be illuminated nine times as brightly as a surface three feet away.

**I.P.S.** Abbreviation for inches per second.

**Iris.** See *Diaphragm*.

**Iris-in.** Otherwise *Circle-in*. The film *wipe*, in which the *image* viewed progressively disappears and at the same time is replaced by another, moving from the centre of the *frame* outwards in the form of a circle.

**Iris-out.** Otherwise *Circle-out*. The film *wipe*, in which the *image* viewed progressively disappears and is replaced by another from the outside of the *frame*, moving inwards in the form of a circle.

**Iris wipe.** Otherwise *Circle-wipe*. A *wipe* in which one *image* replaces another by an *iris-in* to give the effect of backward movement, or *iris-out* to produce the effect of forward movement. Apart from circles, squares, diamonds and other shapes can be employed. These *wipes* are achieved by the camera or *optical printer*.

**Jump cut.** The result of *cutting* a section of film from the middle of a *shot* and joining the two ends of the remainder of the *shot* together. This usually results in a break in *continuity* if there is any movement in the *subject*.

**Key light.** The dominant *light* used for illuminating a *scene* and deciding the key or mood of the *lighting*.

**Key numbers.** See *Edge numbers*.

**Key sounds.** Important *sound effects* that suggest the locale or period. For example: the sound of farm animals, in order to suggest the countryside.



**Kilocycle.** Abbreviated to kc/s. A frequency of one thousand cycles per second. Long wave sound radio, (as opposed to *V.H.F.* and *U.H.F.*), works on frequencies of the order of 150 to 20,000 kc/s.

**Kilowatt.** Abbreviated to kw. A unit of electrical power equal to one thousand watts.

**Kinemins.** Puppets about one-third life size, with a wide range of movements and accessory electronically controlled heads capable of nearly a million different expressions. Each puppet has a metal skeleton, imitating all the main joints and muscles of the human body and plastic skin that behaves in a similar manner to human skin. These puppets were invented by Michael Meyerberg for use in films.

**Kinescope recording.** See *Telerecording*.

**Laboratory.** Abbreviated to *Lab.* The centre for film processing and frequently, all stages of production from negative development to the issue of the release print.

**Lacing-up.** The process of inserting ciné film into a camera, projector or other machine, prior to the film's operational movement through the machine.

**Lambert.** A.S.A. Z7. 1-1942 05.080. Abbreviated to *L.* The lambert is a unit of brightness equal to  $1/\pi$  candles per square centimetre and, therefore, is equal to the brightness of a perfectly diffusing surface emitting or reflecting light at the rate of one lumen per square centimetre.

Note. The lambert is also the average brightness of any surface emitting or

reflecting light at the rate of one lumen per square centimetre. For the general case the average must take account of variation of brightness with the angle of observation and also its variation from point to point on the surface considered.

The lambert has a magnitude suitable for expressing the brightness of bright sources of light, but for most other purposes the millilambert is a preferable unit.

**Laminated record.** A.S.A. Z24.1-1951 8.560. A laminated record is a mechanical recording medium composed of several layers of material. Normally, it is made with a thin face of surface material on each side of a core.

**Lamp.** A.S.A. Z7. 1-1942 25.005. Lamp is a generic term for an artificial source of light.

**Lap dissolve.** See *Dissolve*.

**Lapel microphone.** A.S.A. Z24. 1-1951 10.130. A lapel microphone is a microphone adapted to positioning on the clothing of the user.

**Latent image.** A.S.A. Z22. 56-1947 1.4.1. A latent image is the invisible image registered on a photographic emulsion due to the reaction produced in the emulsion by exposure to light.

Note. The image becomes visible after development.

**Latitude.** In filming, this is the range of exposures permissible with a given emulsion and subject, that will produce images of proportional contrast, although they will vary in overall density. The actual latitude obtainable with any emulsion will depend greatly on the tone range of the subject, the degree of latitude decreasing as the tone range increases in extent.



**Lavender.** The name given to an obsolescent type of *master positive stock* with a lavender tinted base. The term remains in use to describe a *master positive*.

**Leader.** Otherwise Lead or Leader strip. This is the non-*subject* film used for connecting the parts of a *work-print* and for attachment to the beginning and end of a film for threading in a *projector*, *processing* or other machine. (See also *Academy Leader* and *Television Film Leader*.)

**Lens.** A lens is made of transparent material (usually glass) bounded by curved surfaces (usually spherical), or by a curved and a flat surface. In this form it is an optical device which focuses *light* by refraction.

**Lens hood.** A hood placed around a camera *lens* in order to shield it from extraneous *light* reflected from objects outside the field of view.

**Lens panel.** The panel supporting a *lens* or a number of lenses on a camera or other machine. A panel supporting several lenses, such that any one of them can be turned rapidly into the operating position, is known as a *lens turret*.

**Lens turret.** See *Lens Panel*.

**Level above threshold.** A.S.A. Z24. 1-1951 5.055. The level above threshold of a *sound* is the pressure level of the *sound* in *decibels* above its *threshold of audibility* for the individual observer.

**Library shot.** A film *shot* stored for possible future use, often with new material or in a new context, in a *film library*.

**Light.** Light is *radiant energy* evaluated according to its capacity to pro-

duce visual sensation. The velocity of light in a vacuum is about 186,000 miles (about 300,000,000 metres) a second and visible light includes *wavelengths* from about 4000 *AU* to 7200 *AU*. (See also *Spectrum*.)

**Light, distribution curve of.** A.S.A. Z7. 1-1942 40.040. A curve of light distribution is a curve showing the variations of *luminous intensity* of a *lamp* or *luminaire* with the angle of emission.

**Light modulator.** A light modulator (in optical recording), is the combination of a source of *light*, an appropriate optical system and a means for varying the resulting *light* beam (such as a *galvanometer* or *light valve*), so that a *sound track* may be produced.

**Light, Quantity of.** A.S.A. Z7. 1-1942 05.055. The quantity of light is the product of the *luminous flux* by the time it is maintained. It is the time integral of *luminous flux*.

**Lighting.** The *illumination* of the camera *subject* which makes it visible and determines its apparent colour and *brightness*. (See also *Back Lighting*, *Cross Lighting*, *Fill-in Light*, *Frontal Lighting*, *High Key Lighting*, *Highlighting*, *Low Key Lighting*, *Modeling Light*, *Rim* and *Top Light*.)

**Lighting unit.** The term used for a complete unit designed to emit *light* and consisting of a lamp holder and often a *reflector*, a stand and a *lamp*.

**Light meter.** See *Exposure Meter*.

**Light rays.** Beams of *light* travelling from a *light* source in a constant direction, unless deflected through reflection or *refraction* by some material body, or by passage through a gravitational field.



**Lights.** See *Bank, Flood, Inkie and Spotlight.*

**Light trap.** In general, any device used to exclude *light* from sensitive film *emulsions* during storage or handling prior to *development*. A particularly important light trap is that on a film camera magazine.

**Line microphone.** A.S.A. Z24. 1-1951 10.035. A line microphone is a *directional microphone* consisting of a single, straight-line element, or an array of contiguous or spaced *electro-acoustic* transducing elements, disposed on a straight line, or the acoustical equivalent of such an array.

**Line spectrum.** A.S.A. Z24. 1-1951 1.120. A line spectrum is the *spectrum* of a *wave* the components of which are confined to a number of discrete frequencies.

**Lining up.** The setting of camera or other controls, in order to obtain a correctly framed picture.

**Lip microphone.** A.S.A. Z24. 1-1951 10.135. A lip microphone is a *microphone* adapted for use in contact with the lip.

**Lip synchronization.** Abbreviated to Lip sync. The recording of *sound*, usually at the same time as its associated picture, so that on projection of the completed film, the words uttered synchronize exactly with the *performer's* lip movements as shown in the picture.

**Live mike.** A *microphone* that is transmitting.

**Live recording.** A recording of *sound* made at the same time as it originates.

**Live room.** A.S.A. Z24. 1-1951 7.040.

A live room is a room which is characterized by an unusually small amount of *sound* absorption.

**Live transmission.** A transmission of *sound* material without intermediate recording.

**Loading boy.** See *Cameraman: Second Assistant.*

**Location.** Any place used for filming, other than the normal *studio* property.

**Long shot.** Abbreviated to *L.S.* A *shot* in which the camera is at a distance that allows general recognition of the *subject* matter, but prevents the identification of small points of detail (e.g. a crowd shown, without it being possible to identify an individual face).

**Loop.** (1) The section of free-running film allowed in *lacing-up*, so as to provide a safety factor between the *intermittent* and regular *sprocket* movements.

(2) The section of film capable of variation in length during the operation of some types of *processing* machine. This enables the machine to run continuously, there being plenty of slack for it to take up whilst a fresh batch of film is being joined on.

(3) The endless band of film made by joining the ends of a length together and thus permitting continuous running on a *projector* or other machine equipped with the necessary guide and tension pulleys. This type of loop is commonly used in *post-synchronization* and *re-recording*, when a continuous *sound effect* is required. A *release print* may also be joined in this manner for use in a rear-projection box on an exhibition stand or in a company showroom.

**Lot.** The land adjoining *studio* buildings and used for exterior *shooting*.



**Loudness.** A.S.A. Z24. 1-1951 5.015. Loudness is the intensive attribute of an auditory sensation, in terms of which sounds may be ordered on a scale extending from soft to loud.

Note. Loudness depends primarily on the *sound* pressure of the stimulus, but it also depends upon the *frequency* and *wave* form of the stimulus.

**Loudness level.** A.S.A. Z24. 1-1951 5.025. The loudness level, in *phons*, of a *sound* is numerically equal to the sound pressure level in *decibels*, relative to 0.0002 microbar, of a simple tone of *frequency* 1,000 *cycles* per second which is judged by listeners to be equivalent in *loudness*.

**Loudspeaker (Speaker).** A.S.A. Z24. 1-1951 10.175. A loudspeaker is an *electroacoustic transducer* usually intended to radiate acoustic power effectively at a distance in air.

Note. The term "speaker" should be avoided when there is risk of ambiguity.

**Loudspeaker system.** A.S.A. Z24. 1-1951 10.285. A loudspeaker system is a combination of one or more *loudspeakers* and all associated baffles, horns, and dividing networks arranged to work together as a coupling means between the driving electric circuit and the acoustic medium.

**Low key.** The term applied when a majority of the tones in the *subject* or *image* lie at the dark end of the *grey scale*.

**Low key lighting.** *Lighting* designed to produce a *low key* effect.

**L.S.** Abbreviation for *Long Shot*.

**Lumen.** The lumen is a unit of rate of flow of *light* energy and one lumen

equals  $1/4\pi$  *candlepower*, or the *light* power falling on one square metre from a *standard candle* at a distance of one metre.

**Lumen second.** The lumen second is a unit of quantity of *light* energy and is equal to the *light* delivered in one second by a flux of one *lumen*.

**Luminosity.** The term used to describe the quantity of *light* emitted from unit area of a *light* source, or reflected from unit area of a surface. The range of reflectance luminosity (or *brightness*) in the *subject*, is its *contrast*.

**Luminosity factor.** The luminosity factor for radiation of a particular *wavelength* is the ratio of the *luminous flux* at that *wavelength* to the corresponding *radiant flux*. It is expressed in *lumens* per *watt*.

**Luminous efficiency.** The luminous efficiency of *radiant energy* is the ratio of the *luminous flux* to the *radiant flux*. Luminous efficiency is usually expressed in *lumens* per *watt* of *radiant flux* and for energy radiated at a single *wavelength*, it is synonymous with *luminosity factor*.

**Luminous flux.** A.S.A. Z7. 1-1942 05.010. Luminous flux is the time rate of flow of *light*.

**Lux.** A.S.A. Z7. 1-1942 05.045. The lux is the practical unit of *illumination* in the metric system and is equivalent to the "metre-candle". It is the *illumination* on a surface one square metre in area on which there is a uniformly distributed flux of one *lumen*, or the *illumination* produced at a surface all points of which are at a distance of one metre from a uniform point source of one *candle*.



**Machine splicer.** See *Splicer*.

**Magic eye.** An electronic indicator device found in many magnetic sound recorders, in which a change in shadow angle indicates changes in recording level.

**Magnetic armature loudspeaker.** A.S.A. Z24. 1-1951 10.200. A magnetic armature loudspeaker is a *loudspeaker* comprising a ferromagnetic armature actuated by forces of magnetic attraction.

**Magnetic film.** The generic term for film coated with a substance capable of retaining the magnetic variations transferred to it by a *magnetic head* on a recorder.

**Magnetic head.** A.S.A. Z24. 1-1951 8.130. In magnetic recording, a magnetic head is a *transducer* for converting electrical variations into magnetic variations for storage on magnetic media, for reconvertng energy so stored into electrical energy, or for erasing such stored energy.

**Magnetic microphone.** See *Variable-Reluctance Microphone*.

**Magnetic recorder.** A.S.A. Z24. 1-1951 8.090. A magnetic recorder is equipment incorporating an electromagnetic *transducer* and means for moving a ferromagnetic recording medium relative to the *transducer* for recording electric *signals* as magnetic variations in the medium.

Note. The generic term "magnetic recorder" can also be applied to an instrument which has not only facilities for recording electric *signals* as magnetic variations, but also for converting such magnetic variations back into electric variations.

**Magnetic recording head.** A.S.A. Z24.

1-1951 8.135. In magnetic recording, a magnetic recording head is a *magnetic head* for transforming electrical variations for storage on magnetic media.

**Magnetic recording medium.** A.S.A. Z24. 1-1951 8.095. A magnetic recording medium is a magnetizable material used in a *magnetic recorder* for retaining the magnetic variations imparted during the recording process. It may have the form of a wire, tape, cylinder, disc, etc.

**Magnetic recording reproducer.** A.S.A. Z24. 1-1951 8. 125. A magnetic recording reproducer is equipment for converting magnetic variations on magnetic recording media into electric variations.

**Magnetic reproducing head.** A.S.A. Z24. 1-1951 8.140. In magnetic recording, a magnetic reproducing head is a *magnetic head* for converting magnetic variations on magnetic media into electrical variations.

**Magnetic tape.** Usually plastic strip coated with a *magnetic recording medium*, such as iron oxide. The standard tape width is a quarter of an inch and it is marketed spooled in various lengths.

**Magnetostriction loudspeaker.** A.S.A. Z24. 1-1951 10.205. A magnetostriction loudspeaker is a *loudspeaker* in which the mechanical displacement is derived from the deformation of a material having magnetostrictive properties.

**Magnetostriction microphone.** A.S.A. Z24. 1-1951 10.095. A magnetostriction microphone is a *microphone* which depends for its operation on the generation of an electromotive force by the deformation of a material having magnetostrictive properties.



**Married print.** See *Composite Print*.

**Marrying-up.** The joining together of associated picture and *sound* film records to form a *married* (or *composite*) print.

**Mask.** A section of film or other material that is used to limit the quantity or *wavelengths* of light transmitted through it. Masks are employed in filming and film printing. (See *Matte*.)

**Master.** A.S.A. Z24. 1-1951 8.570. A master is a metal part, normally derived from a disc recording by electroforming, which is a negative of the recording, i.e., a master has ridges instead of grooves and thus cannot be played with a pointed stylus.

**Master positive.** A film *positive* of suitable *density* and *contrast*, that is made for the production of a number of *dupe negatives* with the least loss of quality. (See also *Picture Master Positive* and *Sound Master Positive*.)

**Master shot.** See *Establishing shot*.

**Match dissolve.** The overlapping of two *shots* so that, because of the identical positions of their subjects, only one person or object appears to be seen about the point of overlap.

**Matrix.** See *Master*.

**Matt surface glass.** Glass the surface of which has been altered by etching, sand-blasting, grinding, or other process, so that the diffusion of light on transmission is increased.

**Matte.** The term usually applied to a *mask* of any material that is placed in front of the camera *lens*, in order to cut-out or tone down part of the *image*.

**Matte box.** A box fitted to the front of a camera to hold *mattes*. The matte box frequently combines the functions of a *lens hood* and *filter* holder as well.

**Matte rolls.** Otherwise *Travelling Mattes*. Matte rolls are pairs of films made for use as *light* modulators in film *printing* machines and designed to achieve *wipe* effects by masking. They are complementary, in that where one roll is clear, the other is opaque.

**M.C.S.** Abbreviation for *Medium Close-Shot*.

**M.C.U.** Abbreviation for *Medium Close-Up*.

**Mechanical equivalent of light.** The reciprocal of the *luminous efficiency* of *radiant energy* is often termed, the "mechanical equivalent of light". The minimum mechanical equivalent is the *watts* per *lumen* at the *wavelength* of maximum *luminosity*.

**Mechanical phonograph recorder (Mechanical recorder).** A.S.A. Z24. 1-1951 8.380. A mechanical phonograph recorder is an equipment for transforming electric or acoustic *signals* into mechanical motion of approximately like form and inscribing such motion in an appropriate medium by cutting or embossing.

**Medium close shot.** Abbreviated to *M.C.S.* (See *Close Medium Shot*.)

**Medium close-up.** Abbreviated to *M.C.U.* A *shot* midway between a *close medium shot* and a *close-up*. In relation to a person, this would include from about the elbows to just above the head.

**Medium long shot.** Abbreviated to *M.L.S.* A *shot* between a *long shot* and



a *medium shot*. In relation to a person, this would include the whole of the figure and a small surround.

**Medium shot.** Abbreviated to *M.S.* A *shot* midway between a *long shot* and a *close-up*. In relation to a group of people, the bottom of the *frame* would cut about their knees and the *frame* would contain about four persons in width.

**Megacycle.** One million *cycles*. The abbreviation Mc/s is used for megacycles per second.

**Mel.** A.S.A. Z24. 1-1951 5.010. The mel is a unit of *pitch*. By definition, a simple tone of frequency 1,000 *cycles* per second, 40 *decibels* above a listener's threshold, produces a *pitch* of 1,000 mels. The *pitch* of any *sound* that is judged by the listener to be  $n$  times that of a 1-mel tone is  $n$  mels.

**Micron.** A one-millionth part of a metre and therefore equal to 10,000 *Angström Units*.

**Microphone.** A.S.A. Z24. 1-1951 10.005. A microphone is an *electro-acoustic transducer* which responds to *sound waves* and delivers essentially equivalent electric waves. (The various types of microphone are described under their own names. They are: *Antinoise, Bidirectional, Capacitor, Carbon, Close-Talking, Combination, Condenser, Crystal, Directional, Dynamic, Electromagnetic, Electronic, Electrostatic, Gradient, Hot-Wire, Lapel, Line, Magnetic, Magnetostriction, Moving-Coil, Moving-Conductor, Moving-Iron, Nondirectional, Omnidirectional, Parabolic-Reflector, Phase-Shift, Piezoelectric, Pressure, Push-Pull, Ribbon, Standard, Throat, Unidirectional, Variable-Reluctance and Velocity*.)

**Microphone boom.** A *boom* supporting a *microphone* and designed to allow it to be placed in any required position during recording or transmission and controlled by a boom operator, under the direction of the *sound mixer*.

**Mid shot.** See *Medium Shot*.

**Millilambert.** Abbreviated to mL. One thousandth part of a *lambert*.

**Millimicron.** One ten millionth part of a millimetre, or 10 *Angström Units*.

**Mix.** (1) In filming, a picture mix is the same as a *dissolve*.

(2) In relation to sound recording or transmission, to mix is to combine the *sound* from a number of *sound tracks* or *channels* into one.

**Mixer.** (1) A mixer, in a *sound* transmission recording or reproducing system, is a device having two or more inputs, usually adjustable and a common output that operates to combine linearly, in a desired proportion, the separate input *signals* to produce an output *signal*.

(2) The term is also applied to the operator of the above device (*Sound mixer*), who is usually in charge of sound recording or reproduction in the *production unit* concerned.

(3) See *Vision mixer* also.

**M.L.S.** Abbreviation for *Medium Long Shot*.

**Model shot.** A *shot* in which models of large objects are used. For example model ships in a *studio tank* can be effectively operated to simulate a *scene* at sea.

**Modelling light.** The accent *light* that shows the structure and texture of the *subject*, this being the second most important illuminant. (See *Key Light*.)



**Modulation.** The variation of a *carrier wave* in *frequency*, *phase*, or *amplitude*, by imposing electrical impulses corresponding to *sound signals*. (See also *Amplitude Modulation* and *Frequency Modulation*.)

**Modulation noise** (noise behind the signal). A.S.A. Z24. 1-1951 8.070. The modulation noise is the *noise* caused by the *signal*. The *signal* is not to be included as part of the *noise*.

Note. The term is used where the *noise* level is a function of the strength of the *signal*.

**Monitor.** A *loudspeaker* used to check the progress of *sound* recording or reproduction.

**Monitoring.** The control or observance of *sound* in recording or reproduction.

**Monochrome.** Single colour. The term is usually applied to black and white film pictures, to distinguish them from those that are multi-coloured.

**Montage.** The superimposing of a number of separate pictures in filming. The term is also applied to the *editing* of a section of a film in order to obtain a particular type of general impression through joining a number of short *shots* using *dissolves* and montage proper. (See *Dynamic Cutting* also.)

**Mood music.** The background music employed to create the desired mood, or to heighten the dramatic impact of a *scene*.

**Mould.** A.S.A. Z24. 1-1951 8.585. In disc recording, a mould is a metal part derived from a master by electro-forming, which is a positive of the recording, i.e., it has grooves similar to a recording and thus can be played in a manner similar to a record.

**Moving-coil loudspeaker** (dynamic loudspeaker). A.S.A. Z24. 1-1951 10.210. A moving-coil loudspeaker is a *moving-conductor loudspeaker* in which the moving conductor is in the form of a coil conductively connected to a source of electrical energy.

**Moving-coil microphone** (dynamic microphone). A.S.A. Z24. 1-1951 10.100. A moving-coil microphone is a *moving-conductor microphone* in which the movable conductor is in the form of a coil.

**Moving-conductor loudspeaker.** A.S.A. Z24. 1-1951 10.220. A moving-conductor loudspeaker is a *loudspeaker* in which the mechanical forces result from magnetic reactions between the field of the current in a moving conductor and a steady magnetic field.

**Moving-conductor microphone.** A.S.A. Z24. 1-1951 10.105. A moving-conductor microphone is a *microphone* the electric output of which results from the motion of a conductor in a magnetic field.

**Moving iron microphone.** See *Variable-Reluctance Microphone*.

**Moving title machine.** See *Crawl Title Machine*.

**Moviola.** The trade name given to a particular make of film viewing machine used in *editing*.

**M.S.** Abbreviation for *Medium Shot*.

**Multidirectional illumination.** A.S.A. Z7. 1-1942 35.010. Multidirectional illumination on a surface is that produced by several separated *light* sources of relatively small area. It is characterised by the fact that a small opaque object placed near the illuminated surface casts several shadows.



**Multiple exposure.** The exposure of a *light-sensitive emulsion* to more than one *scene*, so that the resultant *image* shows the *scenes* superimposed.

**Multiple sound track.** A.S.A. Z24. 1-1951 8.265. A multiple sound track consists of a group of *sound tracks*, printed adjacently on a common base independent in character but in a common time relationship, e.g., two or more have been used for stereo-*phonic sound* recording.

**Multitrack recording system.** The system employed for the recording of a *multiple sound track*.

**Mural.** The term applied to a very large painting or photograph forming a *background* to the *set* in filming.

**Music library.** A collection of music stored and indexed against possible future use in a film or broadcast.

**Music negative.** A.S.A. Z22. 56-1947 2.3.3. A music negative is a *sound negative* upon which music has been recorded.

Note. It is usually an *original sound negative*, but may be a *library negative*.

**Music print.** A.S.A. Z22. 56-1947. 3.3.4. A music print is a *sound print* made from a *music negative*.

**Mute.** A picture *print* or *negative* having no *sound track* on the same *base*.

**Narrator.** An unseen person who is heard to deliver a commentary to a film.

**National Film Library.** The British historical collection of films controlled by the *British Film Institute*.

**National Film Theatre.** The theatre is sited on the South Bank by London's Waterloo Bridge and is operated by the *British Film Institute*. Members and Associates of the Institute may bring guests and attend showings of cinema classics for a small fee.

**National Association of Theatrical and Kine Employees.** Abbreviated to *N.A.T.K.E.* The appropriate trade union for theatrical production employees and certain grades in film production, distribution and projection.

**N.A.T.K.E.** See *National Association of Theatrical and Kine Employees*.

**Naturalism.** The reproduction of any *subject* or event as it appears in fact.

**Negative.** A.S.A. Z22. 56-1947 2.1. The term "negative" is used to designate any of the following:

(a) the *raw stock* specifically designed for *negative images*,

(b) the *negative image*,

(c) *negative raw stock* which has been exposed but has not been *processed*, and,

(d) film bearing a *negative image* which has been *processed*.

(See also: *Composite negative*, *Dupe* (*Duplicate*) *negative*, *Music negative*, *Original picture negative*, *Original sound negative*, *Picture dupe negative*, *Picture negative*, *Picture release negative* 16 mm., *Release negative*, *Sound cut negative*, *Sound negative*, *Sound release negative*, *Title negative*.)

**Negative Blow-up.** A *negative blow-up* is a *negative* made by *optical printing*, in which a larger *negative image* is produced from a smaller *positive image*.

**Negative image.** A *negative image* is a



photographic *image* in which the values of light and shade of the original *subject* are represented in inverse order. Thus, light objects in the *subject* are represented by high densities and dark objects by low densities.

**Negative perforation, 35 mm.** A.S.A. Z22. 56-1947 1.1.3.1. A 35 mm. negative perforation is the *perforation* used for *negative* and some special purpose 35 mm. films.

Note. It is a *perforation* with sharp corners, curved sides and a straight top and bottom.

**Network.** The linking of a number of *dubbing channels* connected to the same *mixer panel*.

**N.G.** Abbreviation for "no good" and often used to mark data sheets referring to film *takes*.

**Nigger.** A device that shields or limits the *illumination* reaching the *subject* from a particular *lamp* or set of *lamps*.

**Night filter.** An *effect filter* that is red in colour and so absorbs green and blue, to render any *subject* including these colours as a dark *image*. This can, for example, make the *image* of an outdoor *scene* be similar in appearance to that obtained with a genuine night *shot*.

**Nitrate.** The abbreviated name for *cellulose nitrate base*. This material has now been superseded in film manufacture by *cellulose acetate base* and *cellulose tri-acetate base* which, unlike nitrate, burn only with difficulty. Although it is no longer made, much *film library* material is on nitrate *base*.

**Noise.** Noise is any undesired *sound*. By extension, noise is any unwanted disturbance within a useful *frequency*

*band*, such as an undesired *wave* in any transmission *channel* or device.

**Noise reduction.** A.S.A. Z24. 1-1951 8.375. In photographic recording and reproducing, noise reduction is a process whereby the average transmission of the *sound track* of the *print* (averaged across the track) is decreased for *signals* of low level and increased for *signals* of high level.

Note. Since the *background noise* introduced by the *sound track* is less at low transmission, this process reduces film *noise* during soft passages. The effect is normally accomplished automatically.

**Non-directional microphone.** See *Omni-directional Microphone*.

**Non-flam.** Abbreviation for "non-inflammable". The term frequently applied to *cellulose acetate base* and *cellulose tri-acetate base*, both of which are slow burning and non-explosive.

**Normal.** A line perpendicular to a surface.

**Omnidirectional microphone (non-directional microphone).** A.S.A. Z24. 1-1951 10.045. An omnidirectional microphone is a *microphone* the response of which is essentially independent of the direction of *sound* incidence.

Note. It should be noted that, in this case, omnidirectional refers to elevation as well as azimuth. In radio antenna practice this is not necessarily the case.

**Opacity.** In reference to the *light transmission* characteristics of a material, opacity is the reciprocal of *transmission*.



**Opal glass.** A.S.A. Z7. 1-1942 30.205. Opal glass is highly diffusing glass having a nearly white, milky or grey appearance. The diffusing properties are an inherent, internal characteristic of the glass.

**Opalescent glass.** A.S.A. Z7. 1-1942 30.206. Opalescent glass is *opal glass* having the properties of selectively transmitting and diffusing *light*, with a resultant fire appearance when used with concentrated *incandescent* sources of *light*. It is sometimes referred to as "fire opal".

**Opening-up.** Increasing the aperture of a *lens*, usually by means of a *diaphragm*.

**Optical.** A *wipe*, *dissolve*, picture superimposition, or other combination or modification of the picture *image*. Optical effects can be obtained mechanically at the film camera or on an *optical printer*.

**Optical printer.** A machine for film *printing* that employs an intermediate *lens* system. An optical printer may make *prints* by enlargement or reduction, or it may be used for the insertion of *opticals* or other trick effects. (See *printer* also.)

**Optical printing.** See *Projection printing*.

**Optical reversal.** See *Reverse scene*.

**Optical sound recorder.** See *Photographic sound recorder*.

**Optical sound reproducer.** See *Photographic sound reproducer*.

**Original.** The aural or visual *subject* in the first conception, action or recording.

**Original picture negative.** A.S.A. Z22.

56-1947 2.2.1. The original picture negative is the *negative* film which is exposed in the camera and subsequently processed to produce an *original negative picture image*.

**Original sound negative.** A.S.A. Z22. 56-1947 2.3.1. The original sound negative is the *sound negative* which is exposed in a film recorder and after *processing* produces a *negative sound image* on the film.

**Orthochromatic.** Orthochromatic is a term for the *colour response* of a photographic *emulsion* or television *camera tube* that is sensitive to all the colours of the visible *spectrum* except red.

**Oscillation (Vibration).** A.S.A. Z24. 1-1951 1.040. Oscillation is the variation, usually with time, of the magnitude of a quantity with respect to a specified reference when the magnitude is alternately greater and smaller than the reference.

**Outline.** See *Synopsis*.

**Outline lighting.** Outline lighting is that arrangement of *lights* designed to outline and call attention to the main shape of the *subject*, and in the extreme case it is *silhouette lighting*.

**Out-of-focus.** A *subject* is said to be "out-of-focus" in relation to a camera, if the camera is so set-up that the *image* is reproduced with an unacceptable degree of unsharpness in the *image* forming plane of the camera.

**Out-of-phase.** In general, this is the state said to exist when the *phases* of two periodic quantities measured from the same point of origin, are different. In filming, the phrase is used when moving *ciné* film and its



associated *shutter* mechanism are out of step with each other. In electrical terminology, a circuit is said to be out-of-phase when its waveforms are of the same *frequency*, but its components do not pass through corresponding values at the same instants.

**Out-of-sync.** In filming, this term indicates that the *sound* and *action* are not being recorded or reproduced in perfect *synchronization*.

**Outs.** Otherwise *Trims*. The material that is not included in the final edited version of a film.

**Overlap.** The term in film *editing* that indicates the running over of a portion of a *sound track* to combine with a picture to which it does not belong.

**Panchromatic.** The term panchromatic refers to the *colour response* of a photographic *emulsion* that is sensitive to all the colours of the visible *spectrum*.

**Panning.** The traversing of a camera during *shooting*, so that the field of view moves sideways along a *scene*.

**Parabolic-reflector microphone.** A.S.A. Z24. 1-1951 10.040. A parabolic-reflector microphone is a *microphone* employing a parabolic reflector to improve its directivity and sensitivity.

**Parallax.** The apparent change in the position of a body occasioned by altering the position of the observer. In using a camera, parallax is noticed when the *view-finder lens* is other than the taking *lens*, and is not corrected in position to allow for its displacement.

**Pedestal.** A simple vertical support for a film projector.

**Perforation, 16 mm.** A 16 mm. perforation is the *perforation* used in all 16 mm. film. This *perforation* is rectangular in shape and has curved fillets at the corners.

**Perforations.** See *Film perforations*; *Negative perforation, 35 mm.*; *Perforation, 16 mm.* and *Positive perforation, 35 mm.*

**Performer.** (A contract definition.) Any person who appears on the screen and who speaks, sings, mimes or dances, or any person who is heard to sing or speak subject only to the following exceptions:

- (i) instrumental musicians;
- (ii) "extras" and "walk-ons", i.e., persons appearing only incidentally or in backgrounds, or participating only in crowd or *background* speech or noise;
- (iii) persons carrying on their own normal daily occupations, whether at their normal place of work or at the *studio*.

**Performing Right Society Ltd.** An association of composers, authors and publishers of copyright musical works, established to collect fees for the public performance of such works, and to restrain unauthorized performances thereof.

**Permanent-magnet loudspeaker.** A.S.A. Z24. 1-1951 10.225. A permanent-magnet loudspeaker is a *moving-conductor loudspeaker* in which the steady field is produced by means of a permanent magnet.

**Persistence of vision.** The retention of an *image* on the retina of the eye, so that the picture remains visible to the observer after its source has gone. It is the fact of persistence of vision



CC-0. Agamnigam Digital Preservation Foundation. Chennai. The lamp that enables the single pictures of a projected ciné film to appear to merge into a continuous moving picture.

**Phase of a periodic quantity.** A.S.A. Z24. 1-1951 1.080. The phase of a periodic quantity, for a particular value of the independent variable, is the fractional part of a period through which the independent variable has advanced, measured from an arbitrary origin.

Note. In the case of a simple sinusoidal quantity, the origin is usually taken as the last previous passage through zero from the negative to positive direction. The origin is generally so chosen that the fraction is less than unity.

**Phase-shift microphone.** A.S.A. Z24. 1-1951 10.020. A phase-shift microphone is a *microphone* employing phase-shift networks to produce directional properties.

**Phon.** The phon is the unit of *loudness level*.

**Photo-electric cell.** A device for detecting or measuring *light* by a change of electrical resistance produced in the cell when *light* falls upon it. In the photo-electric cells most commonly used, the action of *light* causes a photo-electric current to be generated and this can be used to operate an ammeter (as in an *exposure meter*), an optical *sound* reproducing unit (as in a film projector), or any other device concerned with the translation of variations of *light* into electrical variations.

**Photoflood.** An *incandescent lamp* made to be "over-run" by having a higher than normal voltage applied to its filament. This results in a high

intensity of light, and the life of the lamp is considerably shortened thereby.

**Photographic emulsion.** See *Emulsion, Photographic*.

**Photographic sound recorder** (*Optical sound recorder*). A.S.A. Z24. 1-1951 8.220. A photographic sound recorder is equipment incorporating means for producing a modulated *light* beam and means for moving a light-sensitive medium relative to the beam for recording *signals* derived from *sound signals*.

**Photographic sound reproducer** (*Optical sound reproducer*). A.S.A. Z24. 1-1951 8.300. A photographic sound reproducer is a combination of *light* source, optical system, *photo-electric cell*, or other *light* sensitive device such as a photo-conductive cell, and a mechanism for moving a medium carrying an optical *sound* record (usually film) by means of which the recorded variations may be converted into electrical *signals* of approximately like form.

**Photographic transmission density** (*optical density*). A.S.A. Z24. 1-1951 8.325. Photographic transmission density is the common logarithm of *opacity*. Hence film transmitting 100 per cent of the *light* has a *density* of zero, transmitting 10 per cent a *density* of 1, etc. *Density* may be *diffuse*, *specular*, or intermediate. Conditions must be specified.

**Photometric tests.** A.S.A. Z7. 1-1942 40.095. The results of photometric tests should not be stated in *candle-power* unless the measurements are made at such a distance from the source of *light* that the latter may be regarded as practically a point. When measurements of *lamps* with *reflectors*,



or other accessories, are made at distances such that the *inverse square law* does not apply, the results should be given as "apparent candlepower" at the distance employed, which distance should always be specifically stated. For ordinary illuminants with shades or reflectors, a distance of 3 metres (app. 10 feet) is recommended.

**Picture check print.** A.S.A. Z22. 56-1947 3.2.7. A picture check print is a *picture print* made from the *picture release negative* for the purpose of checking *negative cutting*, *printing* lights, picture quality, etc.

Note. When a picture check print is required, it is usually made prior to the first *trial composite print*.

**Picture daily print.** A.S.A. Z22. 56-1947 3.2.1. A picture daily print is the first *picture print* made from the *original picture negative* for use in checking photographic quality, camera technique, action, etc. (See *Rushes* also.)

**Picture dupe negative.** A.S.A. Z22. 56-1947 2.2.5. A picture dupe negative is a *picture negative* made from a *picture duping print*.

Note. It may be used for making other *picture prints*, or may be cut to form a part of the *picture release negative*.

**Picture duping print.** A.S.A. Z22. 56-1947 3.2.5. A picture duping print is a *picture print* made on a special film for the purpose of producing a *duplicate negative* or for producing *dissolves*, *montages*, *titles*, etc.

Note. Duping print is synonymous with *master positive* except that duping print is the term used in the editorial process, whilst *master positive* is used in *release*.

**Picture master positive.** A.S.A. Z22. 56-1947 3.2.5.1. A picture master

positive is a *picture duping print* usually made for the purpose of producing a *picture dupe negative* for *release printing*.

**Picture negative.** A.S.A. Z22. 56-1947 2.2. A picture negative is any *negative* film which, after *exposure* to a *subject* or *positive image* and subsequent *processing*, produces a *negative picture image* on the film.

**Picture print.** A picture print is any *positive* printed from a *picture negative*, or alternatively from a *picture positive* using *reversal* film.

**Picture release negative.** A.S.A. Z22. 56-1947 2.2.6. A picture release negative is a *release negative* used for printing the picture portion of *release prints*.

Note. It may consist of intercut *original picture negatives*, *picture dupe negatives*, etc., depending upon the choice of available material or the intended use of the *release print*.

**Picture release negative, 16 mm.** A.S.A. Z22. 56-1947 2.2.8. A 16 mm. picture release negative is a *picture release negative* on 16 mm. film prepared specifically for *printing* 16 mm. *release prints*.

Note. It is almost invariably a *dupe negative*.

**Picture work print.** A.S.A. Z22. 56-1947 3.2.2. A picture work print is a *positive print* which usually consists of intercut *picture daily prints*, *picture library prints*, *prints of dissolves*, *montages*, *titles*, etc., and has *synchronism* constantly maintained with the corresponding *sound work print*.

Note. A picture work print is used to edit and combine the various *picture scenes* of a motion picture into the desired form.



**Piezoelectric effect.** A property of some asymmetric crystals, such that when subjected to pressure, charges of positive and negative electricity are produced on opposing faces. The signs of these charges are reversed when forward pressure is replaced by pull. The inverse effect is that the shape of the crystal is altered when it is subjected to an electric potential.

**Piezoelectric loudspeaker.** See *Crystal loudspeaker*.

**Piezoelectric microphone.** *Crystal microphone*.

**Pitch.** A.S.A. Z24. 1-1951 5.005. Pitch is that attribute of auditory sensation in terms of which *sounds* may be ordered on a scale extending from low to high, such as a musical scale.

Note. (1) Pitch depends primarily upon the *frequency* of the *sound* stimulus, but it also depends on the *sound* pressure and the *wave* form of the stimulus.

(2) The pitch of a *sound* may be described by the *frequency* of that simple tone, having a specified sound pressure or *loudness level*, which seems to the average normal ear to produce the same pitch.

**Playback.** The reproduction of a *sound* recording.

**Pneumatic loudspeaker.** A.S.A. Z24. 1-1951 10.230. A pneumatic loudspeaker is a *loudspeaker* in which the acoustic output results from controlled variation of an air stream.

**Point source of light.** A theoretical concept in which all the *light* emitted emanates from a single point. In practice, when the *light* issues from a source whose dimensions are negligible in comparison with the distance from

**Polished plate glass.** A.S.A. Z7. 1-1942 30.260. Polished plate glass is glass whose surface irregularities have been removed by grinding and polishing, so that the surfaces are approximately plane and parallel.

**Polyester base.** A tough and flexible plastic base for magnetic recording tape. The material is used by some manufacturers for their "long-play" tapes.

**Positive.** See *Print*.

**Positive perforation, 35 mm.** A.S.A. Z22. 56-1947 1.1.3.2. A 35 mm. positive perforation is the *perforation* used for *positive* 35 mm. film.

Note. This *perforation* is rectangular in shape and has fillets at the corners.

**Post-synchronization.** The technique used in filming, whereby a *sound track* is added to a silent film, the *sound* being recorded in *synchronism* with the picture. Post-synchronization is common when the acoustic properties of the *original set* did not permit good quality speech recording, e.g. in a public thoroughfare.

**Pre-scoring.** The recording of a *sound track* before the picture is *shot* and to which the *action* must be added in *synchronism*. This is the method usually employed when making *animation* films.

**Pressure microphone.** A.S.A. Z24. 1-1951 10.010. A pressure microphone is a *microphone* in which the electric output substantially corresponds to the instantaneous sound pressure of the impressed *sound waves*.

Note. A pressure microphone is a



*gradient microphone* of zero order and is nondirectional when its dimensions are small compared to a *wavelength*.

**Preview.** The presentation of a film before general exhibition.

**Primary colours.** Colours which, when combined in the proper proportions, can be used to produce all other saturated colours. The three colours are red, green and blue-violet lights, or cyan, magenta and yellow pigments.

**Print or positive.** A.S.A. Z22. 56-1947 3.1. The term "positive" or "print" is used to designate any of the following:

- (a) the *raw stock* specifically designed for positive *images*;
- (b) the positive *image*;
- (c) positive *raw stock* which has been exposed, but has not been processed;
- (d) film bearing a positive *image* which has been processed.

**Printer.** A machine for reproducing the *image* on one film upon another.

(1) **CONTINUOUS PRINTER.** A printer in which the film to be printed and the *raw stock* are in continuous movement during *exposure*.

(2) **STEP PRINTER.** A printer in which the film to be printed and the *raw stock* are moved intermittently, and are stationary whilst being exposed one *frame* at a time.

(See *Contact printer* and *Optical printer* also.)

**Printer light.** The light setting on a film *printer*, which can be varied to compensate for *density* differences in the film to be printed. This variation is achieved either manually or automatically, depending on the type of mechanism employed.

**Printing.** A.S.A. Z22. 56-1947. 1.8. Printing is the process of exposing *raw stock* by using the *image* of another film as the *light* modulator.

Note. Through printing, one may produce a *positive print* from a *negative* film; a *negative* film from a *positive* film; or, if the reversal process is employed, printing may be used to produce *positives* from *positives* or *negatives* from *negatives*. When the verb "to print" is used, any of the above processes may be implied.

**Print through.** Transfer of the magnetic pattern from layer to adjacent layer of spooled recording tape. This effect is most pronounced if the tape is subjected to high temperatures and/or has over modulated passages.

**Prismatic glass.** A.S.A. Z7. 1-1942 30.245. Prismatic glass is clear glass into whose surface is fabricated a series of prisms, the function of which is to direct the *incident light* in desired directions.

**Processing.** The chemical processes whereby exposed film is developed and the *image* revealed thereby is fixed and prepared for further use.

**Process projection.** See *Back projection*.

**Process shot.** A *shot* combining *action* and *props* with the *image* cast on a *background screen* by *process projection*.

**Producer.** The senior executive in charge of a film *production* and often the person responsible for final payment, or his personal representative.

**Production.** Production is the generic term used to describe the processes involved in preparing all the *original* material that is the basis for the finished motion picture.



**Production Manager.** In filming, this post is often held by the Assistant *Director* and he is responsible for ensuring that everything and every person concerned in *production* is available at the right place at the right time and that all the necessary processes of *production* are performed as required.

**Production Unit.** The collective term for the persons engaged in a *production*.

**Projection.** A.S.A. Z22. 56-1947 1.9. Projection is the process of presenting a film for either visual or aural review, or both.

**Projection print.** A film *print* made for use in a *projector*. (See *Release* also.)

**Projection printing (Optical printing).** A.S.A. Z22. 56-1947 1.8.2. Projection printing (optical printing) is *printing* by projecting the *image* to be copied on the *raw stock*.

Note. When projection printing, the *image* being copied may be enlarged, reduced, or made the same size.

**Projection synchronism.** A.S.A. Z22. 56-1947 1.5.1. Projection synchronism is the time relation between the picture and corresponding *sound* in a *projection print*.

Note. Correct projection synchronism is indicated by exact coincidence of picture and *sound* as seen and heard. To attain this result, it is necessary to place the *sound track* 20 *frames* ahead of the centre of the corresponding picture for 35 mm. film and 26 *frames* ahead of the corresponding picture for 16 mm. film, since sound motion picture *projection* equipment is designed for projection synchronism with this relationship existing between the locations of the projected picture and corresponding *sound*.

**Projector.** A machine designed to throw a film *image* upon a *screen*.

**Property manager.** The person responsible for obtaining, storing and supplying all the inanimate items required for a *set*.

**Property plot.** See *Property sheet*.

**Property sheet.** Otherwise *Property plot*. The schedule of *props* to be used in a *production*.

**Props.** Abbreviation for properties. The inanimate items used for a *set*.

**Pull back.** The backward movement of a camera from a close to a *long shot*.

**Pull down.** The intermittent mechanism used to move film in a camera, *projector* or *printer* by engaging in the film *perforations*.

**Punch up.** In acting, this is to add emphasis to a phrase or action. In filming, the term means to increase picture *brightness*, and in recording, to bring in a new sound, or to increase the *volume* or *pitch* of an existing *sound*.

**Puppets.** Dolls made of various materials, usually in the likeness of human beings or animals, and capable of controlled movement. Puppets may be operated directly by hand, indirectly by strings, or electrically as in the case of the *Kinemins*.

**Push-over wipe.** A horizontal *wipe* in which a picture gradually replaces the original one, as if it is pushing it out of *frame*.

**Push-pull microphone.** A.S.A. Z24. 1-1951 10.110. A push-pull microphone is a *microphone* which makes use of two like *microphone* elements



actuated by the same *sound waves* and operating 180 degrees *out-of-phase*.

**Push-pull sound track, Class-A.** A.S.A. Z24. 1-1951. A class-A push-pull sound track consists of two single tracks, side by side, the transmission of one being 180 degrees *out-of-phase* with the transmission of the other. Both positive and negative halves of the *sound wave* are linearly recorded on each of the two tracks.

**Push-pull sound track, Class-B.** A.S.A. Z24. 1-1951. A class-B push-pull sound track consists of two tracks, side by side, one of which carries the positive half of the *signal* only, and the other the negative half. During the inoperative half cycle, each track transmits little or no light.

**P.V.C. base.** Abbreviation for polyvinyl chloride base. A tough and flexible plastic base for magnetic recording tape. This is the standard material used by British manufacturers and is made in standard and "long-play" thicknesses.

**Radiancy.** See *Radiant Flux Density*.

**Radiant energy.** A.S.A. Z7. 1-1942 10.005. Radiant energy is energy travelling in the form of *electromagnetic waves*. It is measured in units of energy such as ergs, joules, calories or kilowatt-hours.

**Radiant energy density.** Radiant energy density is *radiant energy* per unit volume; e.g., ergs/cm<sup>3</sup>.

**Radiant flux.** A.S.A. Z7. 1-1942 10.015. Radiant flux is the time rate of flow of *radiant energy*. It is expressed preferably in *watts*, or in ergs per second. (Mathematical section omitted.)

**Radiant flux density.** A.S.A. Z7. 1-1942. 10.025. Radiant flux density at an element of surface is the ratio of *radiant flux* at that element of surface to the area of that element; e.g., watts/cm<sup>2</sup>. When referring to a source of *radiant flux*, this is also called *radiancy*.

**Rate of decay.** A.S.A. Z24. 1-1951 1.270. The rate of decay is the time rate at which the sound pressure level (or velocity level, or sound-energy density level) is decreasing at a given point and at a given time. The practical unit is the *decibel* per second.

**Raw stock.** A.S.A. Z22. 56-1947 1.1.1. Raw stock is film which has not been exposed or processed.

**Reaction shot.** A *shot* inserted into a *sequence* in order to show the reaction of the *subject* to an action or *sound*.

**Reconditioning.** The treatment of processed film to remove *scratches*, stains and other unwanted surface marks and abrasions.

**Recording channel.** A.S.A. Z24. 1-1951 8.025. The term "recording channel" refers to one of a number of independent recorders in a recording system or to independent re-recording tracks on a recording medium.

Note. One or more *channels* may be used at the same time for covering different ranges of the transmitted *frequency band*, for multichannel recording, or for control purposes.

**Reduction printing.** A.S.A. Z22. 56-1947 1.8.2.1. Reduction printing is the process of producing and recording photographically a smaller *image*, usually on a smaller film, from a larger *image*.

Note. This process is commonly used in making 16 mm. *negatives* or



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*prints* from 35 mm. *originals*. Film thus made is referred to as a reduction negative or reduction print, as the case may be.

**Reel.** The metal or plastic spool with side pieces on which film is wound for projection. The capacities of standard reels are: 35 mm. ..800; 1,000 and 2,000 feet. 16 mm. ..50; 100; 200; 400; 800; 1,200; 1,600 and 2,000 feet.

**Reflection.** See *Diffuse reflection* and *Regular reflection*.

**Reflection factor; reflectance.** The reflection factor (or reflectance) of a surface or body is the ratio between the *light* falling upon it and the *light* reflected therefrom. (See also, *Diffuse reflection factor* and *Regular reflection factor*.)

**Reflector.** A light-toned or polished surface employed to reflect *light* and situated behind a *lamp*, or in a position where it can transfer *light* falling upon it to illuminate an area indirectly. The directional quality and degree of *reflection* (*reflection factor*) will generally depend on the nature of the reflector surface, these being greater with lighter-toned or more polished surfaces.

**Refraction of light.** When a ray of *light* travels obliquely from one medium to another, it is bent (or refracted) at the surface separating the two media. The ray before refraction is termed the incident ray and on being refracted, it is called the refracted ray. A line perpendicular to the refracting medium at the point where the incident ray enters it, is the *normal*. Glass and other media cause the incident ray to be turned towards the *normal* when the *light* enters from a mediumless optically

dense, such as air. Similar considerations apply to wave-motions other than *light*. (See *Angle of refraction*.)

**Refractive index.** This term is used for the ratio of the sine of the *angle of incidence* to the sine of the *angle of refraction* when *light* is refracted from a vacuum (or air) into the medium under consideration.

**Refractor.** A refractor is a device which redirects *light* by refraction. *Prismatic glass* fulfils this function.

**Regular reflection.** Otherwise *Specular reflection*. Regular (or specular) reflection is that in which the angle of reflection is equal to the *angle of incidence*.

**Regular reflection factor.** The regular reflection factor of a surface or body is the ratio of the *light* reflected regularly from it to the *light* falling upon the surface or body.

**Regular transmission.** A.S.A. Z7. 1-1942 30.110. Regular transmission is that in which the transmitted light is not diffused. In such transmission the direction of a transmitted pencil of *light* has a definite geometrical relation to the corresponding incident pencil. When the direction of the *light* is not changed, the transmission is called direct.

Note. The transmission of *light* by a body may be regular, diffuse, or mixed. In many practical cases there is a superimposition of regular and *diffuse transmission*.

It should be noted also that transmission factors as defined (see *Diffuse transmission factor* and *Regular transmission factor*), refer to the ratio of *light* emerging from the body concerned to the *light* incident upon it. Reflections at the surfaces, as well as



absorption within the body, therefore operate to reduce the transmission.

Since transmission and reflection factors depend in general on the *angle of incidence*, this angle should be stated. If the angle is not given, incidence is assumed to be practically *normal*. Transmission and reflection factors frequently vary also with the quality of *light* used and consequently, the quality of the *light* or the characteristics of the illuminant used should be specified.

**Regular transmission factor.** The regular transmission factor of a body is the ratio of the regularly transmitted light to the *light* falling upon the body.

**Release.** Release is a generic term for films used or intended for distribution or exhibition.

Note. Unless specifically stated otherwise, release refers only to the normal or domestic release of motion picture production through agencies within the country of origin. (See *Foreign release* also.)

**Release negative.** A.S.A. Z22. 56-1947 1.13.3. A release negative is a complete *negative* prepared specifically for printing *release prints*.

Note. A release negative may consist of separate picture and *sound negatives* and may be in either *projection* or *editorial synchronism*, depending upon the film *processing* technique to be employed in making *release prints*.

**Release print.** A.S.A. Z22. 56-1947 3.4.6. A release print is a *composite print* made for general distribution and exhibition after the *final trial composite* or *sample print* has been approved. It is in *projection synchronism*.

**Report sheets.** In film production, these are the data sheets compiled by the picture and sound recording technicians listing the *takes*, stating which ones are to be printed and giving other pertinent information for the *laboratory* and the film *editor*.

**Reprint.** A section of film printed from the *negative* in order to repair a damaged *print*, or to provide for a repeat of that *action* or *sound* in the final film. In the latter case, if more than one *release print* is to be made, the *negative* is duped to provide a section for insertion in the *release negative*.

**Re-recording.** A.S.A. Z22. 56-1947 1.12. Re-recording is the electrical process of transferring *sound* records from one or more films or discs to other films or discs.

Note. Re-recording may be used to combine different *sound* records into a single record; to adjust the response-frequency characteristic; or to adjust the relative levels between different *scenes* and *sequences*.

**Re-recording print.** A.S.A. Z22. 56-1947 3.3.5. A re-recording print is a *sound print* prepared specifically for use in *re-recording* to produce a re-recorded *negative*.

Note. It may be a *print* from a *sound cut negative*, a specially intercut *print*, or a combination of both. A re-recording print may consist of several *sound* records on separate films including dialogue, *sound effects*, music or any other required material. The term is used interchangeably to designate the entire group of associated films or any individual film which is part of the group.



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**Resolution.** See *Definition*.

**Retake.** The repeat of a film picture or *sound take*.

**Return.** Otherwise *Return Flat*. A *scenery flat* designed to add depth to a *scene* by being placed behind some part of the *set*, such as a window. Also, *flats* providing the sides and *background* to a *set* and thus preventing the cameras over-shooting the area of immediate interest. An example of this latter use, is the placing of the *subject* matter in the corner of a room.

**Reversal film.** A.S.A. Z22. 56-1947 4.1. A reversal film is one which after *exposure* is processed to produce a *positive image* on the same film rather than the customary *negative image*. If *exposure* is made by *printing* from a *negative*, a *negative image* is produced directly.

Note. Reversal films may be black and white or colour and either *sound* or picture, or both and they are usually 16 mm. films.

**Reversal process.** A.S.A. Z22. 56-1947 4.2. The reversal process is the photographic process which *reversal films* undergo. It is a process in which a *latent image* is developed to a silver *image* by primary *development*, destroyed by a chemical bleach, and the remaining sensitized material exposed and developed in a second developer bath before *fixing* and washing.

**Reverse angle shot.** See *Reverse shot*.

**Reverse motion.** The technique used in film production to obtain a *projection print* in which *action* and/or *sound* is the reverse of that in the *original subject*. The reverse motion

picture is usually made by turning the camera upside-down during filming and then projecting the resultant *print* tail first. The effect obtained is useful in comic *sequences*.

**Reverse scene.** Otherwise *Optical reversal*. The film term for the *optical printing* of a *positive* when the *emulsion* side of the *raw stock* faces the base of the *negative*. This results in the *image* being reversed left to right as in a mirror. However, because of the intervention of the *base* of the *negative* between the *image* and the *raw stock emulsion*, there is some loss of *definition* in the *print*.

**Reverse shot.** Otherwise *Reverse angle shot*. A *shot* in which the *subject* is shown from the opposite side to that seen in the previous *shot*. This is done by using two cameras facing each other and the *subject*, and cutting between them alternately. By this means the feeling of movement can be obtained with a static *subject*.

**Rewind.** A mechanical device having *reel* and/or *core* holders driven by hand or an electric motor, and used for rewinding *ciné* film.

**Ribbon microphone.** A.S.A. Z24. 1-1951 10.115. A ribbon microphone is a *moving-conductor microphone* in which the moving conductor is in the form of a ribbon which is directly driven by the *sound waves*.

**Rigging.** The arranging of *lights* on a *set* in the approximate positions for use.

**Rim light.** A *light* placed behind the *subject* so that the *light rays* catch its edge and are directed towards the



**camera.** The effect is to provide a sparkling halo of *light* around the *subject* and so separate it from the *background*. (See *Lighting* also.)

**Riser.** A small platform or block used to raise a *prop* or *performer* above ground or floor level.

**Roll 'em.** The executive words of command given by a film *director* for the picture and/or *sound* recorders to commence running.

**Roll up.** The *optical* effect whereby one *scene* appears to roll up from the bottom of the *frame*, revealing another beneath it.

**Rotating wipe.** A *wipe* in which a straight edge rotates about a fixed point and replaces one *scene* by another.

**Rough cut.** The film *workprint* at an intermediate stage of *editing*, showing the various picture and *sound takes* in their correct sequence.

**Royal Photographic Society.** Abbreviated to *R.P.S.* The senior learned photographic society, founded in 1853 "to promote the general advancement of Photography and its applications". The membership is world-wide and the Society issues "The Photographic Journal", "The Journal of Photographic Science", "The Year's Photography" and "Photographic Abstracts". Members of the Society are eligible for the Associateship and Fellowship on giving evidence of distinguished photographic ability and are then entitled to use the letters A.R.P.S. and F.R.P.S. respectively.

**R.P.S.** See *Royal Photographic Society*.

**Run through.** A *camera rehearsal* with *sound*.

**Run up.** The term given to the passage of film or a magnetic recording medium through a camera or recorder before the correct recording speed is obtained; or through a *projector* or other machine before the first *subject image* or *sound* is reached.

**Running shot.** A *shot* taken whilst the camera moves with the *subject*.

**Rushes.** Otherwise *Dailies*. The first *prints* produced from *negative* material and having limited corrections. Rushes are made as quickly as possible by the *laboratory*, so that the *shots* can be examined by those chiefly concerned with the *production* and *editing* of the film. (See *Picture daily print* and *Sound daily print* also.)

**Safety base.** Safety base is the slow burning film *base* used in motion picture film. At the present time, all film made in Britain and the U.S.A. has a safety base and this is defined by the A.S.A. in Standard Z22. 31-1946. (See *Cellulose acetate base* and *Cellulose tri-acetate base* also.)

**Sample print.** See *Final trial composite*.

**Saturation.** (1) The condition achieved when a colour is pure and vivid in *hue*. A desaturated colour is one made pale, as if it has been mixed with white.

(2) Saturation is the condition obtained when a magnetic field has reached maximum possible density.

(3) Saturation in a valve is the condition in which the maximum current is passing through the anode circuit.



**Scanning.** In filming, an optical *sound track* is recorded by a process that involves the translation of *sound waves* into electrical current and from thence into a beam of *light* of corresponding variable nature. The process is reversed when the optical *image* is subjected to analysis (scanning) by a beam of *light* for translation via an electrical current into *sound waves*.

**Scattering surfaces and media.** A.S.A. Z7. 1-1942 30.075. Scattering surfaces and media are those which redirect the *light* into a multiplicity of separate pencils by reflection or transmission as, for example, rippled glass.

**Scenario.** A *script* broken down to show the *scenes*, main *action* and dialogue.

**Scenario Editor.** Otherwise *Script Editor*. The title usually applied to the person in charge of the story department of a film producing company.

**Scene.** A natural section of a film in which the location and time of *action* remains the same. Also the actual *subject matter* of a film.

**Scenery.** The various parts and accessories used on the *set* to represent the actual *scene* of an *action*.

**Scoop.** A wide-angle *flood lighting unit*, which may be focussing or non-focussing.

**Scratches.** Scratches tend to be quite common on film *prints* that have been projected many times. Scratches may be caused by contact with *processing machines*, cameras, *projectors*, by careless *rewinding* or other bad handling. Whilst some damage is inevitable with old *prints*, it is essential to ensure

that the *negative* remains scratch-free or the damage will be faithfully reproduced on every *print*. Common practice is to make *dupe negatives* for *printing* when many copies are required and so the *original negative* is protected. (See *Cinch marks* and *Reconditioning* also.)

**Screen.** In filming, a screen is the surface used to receive the projected *positive image*.

- (a) BEADED SCREEN. A beaded projection screen is surfaced with small glass beads and a brilliant *image* is obtained that is strongly directional towards the *projector*.
- (b) MATTE SCREEN. A matte projection screen has a smooth surface and the diffused *image* reproduced thereon varies little in quality as the viewer decreases his angle of view relative to the screen surface.
- (c) METALLIC SCREEN. A metallic projection screen is one surfaced with metal particles, each one of which acts as a mirror. The result is a bright non-directional *image*, but one that suffers from objectionable over-bright spots around some *highlights*.
- (d) TRANSLUCENT SCREEN. A translucent screen is semi-transparent and is usually used for *back projection*.

**Scrim.** Scrim is material (usually wire gauze), for diffusing a *lamp* by cutting off part of the *light* emitted. (See *Flag* also.)

**Script.** The detailed statement of *action*, dialogue, artistic and mechanical directions that provides the basis of a film *production*.

**Script Editor.** Otherwise *Scenario Editor*. The person responsible in a film production organization for finding,



selecting and adapting suitable *script* material.

**Script girl.** See *Continuity girl*.

**Sensitivity.** The degree of response of a *film*, or other material or apparatus to the recording or transmission of a *scene* under standard conditions of use. (See *H and D curve* also.)

**Sensitometry.** A.S.A. Z24. 1-1951 8.345. Sensitometry is the measurement of the light-response characteristics of photographic *film* under specified conditions of *exposure* and *development*.

**Sequence.** A *scene* or number of consecutive *scenes*, that forms a complete piece of action.

**Set.** The *scenery* and *props* that are combined to form a *scene* for filming.

**Set-up.** The arrangement of the *scenery*, *props*, *performers*, *lights*, *microphones* and cameras for a particular *shot*.

**Shaving.** A.S.A. Z24. 1-1951 8.535. In mechanical recording, shaving is the process of removing material from the surface of a recording medium for the purpose of obtaining a new recording surface.

**Shooting.** The use of a film camera to record a *subject*.

**Shooting script.** The final *script* as approved for *production* and including all necessary technical instructions.

**Shot.** The basic picture unit in filming in which the camera angle, distance and *subject* matter remain the same, or vary only very slightly.

**Shoulder of an H & D Curve.** The shoulder of an *H & D Curve* is the

non-linear portion which lies above the straight line section of the curve.

**Shrinkage.** The reduction in the mass and dimensions of *film* resulting from loss of moisture. Shrinkage is great and rapid during drying and after *processing*, but continues slowly thereafter. If shrinkage exceeds certain limits in a *print*, then it is likely to tear on *projection* and in some machines this eventuality is avoided by means of an incorporated compensatory or safety mechanism. *Image* superimposition, such as in some types of colour *printing*, can easily be affected by bad registration resulting from shrinkage.

**Shutter.** (1) In filming, a shutter is an automatic device that allows *light* passing through the *lens* to reach the film *emulsion* and to act on it for a predetermined period to make the desired *exposure*.

(2) In film projection, a shutter is an automatic device that stops *light* passing through the film whilst it is being moved forward from one *frame* to the next.

**Signal.** The form or variation with time of a *wave* which provides a means of conveying information.

**Signal-to-noise ratio.** The ratio between the strength of the useful *signal* and the unwanted *noise*, in the transmission of information.

**Silent speed.** The movement of ciné film at the rate of 16 *frames* per second.

**Silhouette.** The outline of the *subject* shown without frontal detail against the *light*, or cast as a shadow.

**Silver halides.** The generic term for the three light sensitive silver salts



CC-0. Agamnigam Digital used in photographic *emulsions*. They are: silver bromide, silver chloride and silver iodide.

**Single shot.** The method of exposing each *frame* of a *ciné* film individually, thus making a series of still *shots*. (See *Stop motion* also.)

**Single-system recording.** The filming method whereby a camera is employed that records both the picture and *sound track* simultaneously on the same film. This system is mostly used for the preparation of newsreels.

**Single track (Standard track).** A.S.A. Z24. 1-1951 8.275. A single track is a *variable-density* or *variable-area sound track* in which both positive and negative halves of the *signal* are linearly recorded.

**Single-track recorder.** A magnetic tape recorder using a single track, usually the full width of the tape. (See *Full-track recorder* also.)

**Slate.** The slate is a board on which is marked the names of the film, the *director*, the *cameraman* and the number of the *scene* and *take*. It is usual to combine the slate with a *clapper board* so that when the picture and *sound* recorders are running in *synchronism*, the slate is shown in front of the camera and the clapper arm is banged down. In this way, a means is provided of synchronizing the picture and *sound* in *editing* simultaneously with identification of the *shot*.

**Slide.** See *Transparency*.

**Slow motion.** The effect of slow motion is obtained on projection of the *print* at normal speed, when the *original picture negative* was *shot* with the film

Presevation Foundation, Chandigarh being moved at a faster than normal speed.

**S.M.P.T.E.** Abbreviation for *The Society of Motion Picture and Television Engineers*.

**Society of Authors.** The Society was founded in 1884 to represent, assist and protect authors. Today, within the framework of the Society, separate associations have been created for specialist groups; i.e. The League of Dramatists. The *British Screen and Television Writers' Association* and The Radio and Television Writers' Association. Members are entitled to both legal and general advice on all matters pertaining to the practice of authorship.

**Society Leader.** The old name for the *Television Film Leader*.

**Society of Motion Picture and Television Engineers.** Abbreviated to *S.M.P.T.E.* The senior technical body concerned with cinematography and television in the U.S.A. The Society's journal is widely quoted throughout the world as being authoritative on matters within its purview. In Britain, the *British Kinematograph Society* was created originally as the British branch of the S.M.P.T.E., but it is now independent and it fulfils, in Britain, similar functions to the S.M.P.T.E.

**Soft edge wipe.** A soft edge wipe is a *wipe* in which the edge line is blurred to the required extent by putting the *wipe mask out-of-focus*.

**Soft focus.** The diffused *image* effect obtained by operating the camera with the *lens* slightly *out-of-focus*, or by placing a suitable diffusing material between the *lens* and the *subject*. Slight diffusion of the *image* is also



possible through the use of a clear glass *filter* bearing circular engraved lines on its surface.

**Sone.** A.S.A. Z24. 1-1951 5.020. The sone is a unit of *loudness*. By definition, a simple tone of *frequency* 1,000 cycles per second, 40 *decibels* above a listener's threshold, produces a *loudness* of one sone. The *loudness* of any *sound* that is judged by the listener to be  $n$  times that of the one-sone tone is  $n$  sones.

Note 1. A millisone is equal to 0.001 sone.

Note 2. The loudness scale is a relation between *loudness* and *level above threshold* for a particular listener. In presenting data relating *loudness* in sones to sound pressure level, or in averaging the *loudness* scales of several listeners the thresholds (measured or assumed) should be specified.

Note 3. The term "loudness unit" has been used for the basic subdivision of a *loudness* scale based on group judgement on which a *loudness level* of 40 *phons* has a *loudness* of approximately 1,000 loudness units. For example, see Figure 1 of American Standard for Noise Measurement, Z24. 2-1942.

**Sound.** A.S.A. Z24. 1-1951 1.005. (a) Sound is an alteration in pressure, stress, particle displacement, particle velocity, etc., which is propagated in an elastic material, or the superimposition of such propagated alterations.

(b) Sound is also auditory sensation which is usually evoked by the alterations described above.

Note. In case of possible confusion, the term "*sound wave*" or "*elastic wave*" may be used for concept (a), and the term "*sound sensation*" for concept (b).

**Sound absorption.** A.S.A. Z24.1-1951 2.265. Sound absorption is the process by which *sound* energy is diminished in passing through a medium or in striking a surface.

**Sound camera.** (1) A film picture camera that makes no external noise in operation and is therefore suitable for use when *sound* is being recorded.

(2) A camera that records *sound* on film.

**Sound check print.** A.S.A. Z22. 56-1947 3.3.7. A sound check print is a *sound print* made from the *sound release negative* for the purpose of checking *negative cutting*, printing lights, *sound* quality, etc.

Note. When a sound check print is required, it is usually made prior to the *first trial composite print*.

**Sound cutter.** The *cutter* who prepares the dialogue, music and *sound effects* tracks for a film.

**Sound daily print.** A.S.A. Z22. 56-1947 3.3.1. A sound daily print is the first *sound print* made from the *original sound negative* for checking *sound* quality, technique, etc. (See *Rushes* also.)

**Sound displacement.** The optical or magnetic sound reproducer on a *projector* is normally placed ahead of its associated picture and so *sound* and picture are displaced relative to each other. The optical sound displacement is equivalent to 20 *frames* with 35 mm. film and 26 *frames* with 16 mm. film.

**Sound effects.** The *sounds* added to voices and music and usually occupying a separate *sound track* up to the *re-recording* stage.



**Sound film.** (1) A type of film that is suitable for *sound* recording.

(2) The term is also used in a general sense for a film that includes both picture and *sound*.

**Sound head.** (1) The mechanism in a film reproducer that is concerned with reproduction of the *sound track*.

(2) The mechanism in a film *printing* machine that is concerned with the *printing* of the *sound track*.

**Sound image.** The photographic *image* of a *sound*, as in a film *sound track*.

**Sound intensity (specific sound-energy flux) (sound-energy flux density).** A.S.A. Z24. 1-1951 1.370. The sound intensity in a specified direction at a point is the average rate of *sound energy* transmitted in the specified direction through a unit area *normal* to this direction at the point considered. The commonly used unit is the erg per second per square centimetre, but sound intensity may also be expressed in *watts* per square centimetre. (Mathematical section omitted.)

**Sound master positive.** A.S.A. Z22. 56-1947 3.3.8. A sound master positive is a *sound print* on special film stock and is usually made from a *sound release negative* for the purpose of producing *sound dupe negatives* for *release printing*.

**Sound mixer.** See *Mixer*.

**Sound negative.** A.S.A. Z22. 56-1947 2.3. A sound negative is any *negative* film which, after *exposure* to a *positive sound image* and subsequent *processing*, produces a *negative sound track* on the film.

**Sound power of a source.** A.S.A. Z24. 1-1951 1.440. The sound power of a

source is the total *sound energy* radiated by the source per unit of time. The commonly used unit is the erg per second, but the power may also be expressed in *watts*.

**Sound print.** A.S.A. Z22. 56-1947 3.3. A sound print is any *positive* printed from a *sound negative*.

**Sound recording system.** A.S.A. Z24. 1-1951 8.005. A sound recording system is a combination of transducing devices and associated equipment suitable for storing *sound* in a form capable of subsequent reproduction.

**Sound release negative.** A.S.A. Z22. 56-1947 2.3.6. A sound release negative is a *release negative* prepared for *printing* the *sound* portion of *release prints*.

Note. It may consist of re-recorded *negatives*, intercut *original sound negatives*, *sound dupe negatives*, etc., depending upon the choice of available material or the intended use of the *print*.

**Sound reproducing system.** A.S.A. Z24. 1-1951 8.010. A sound reproducing system is a combination of transducing devices and associated equipment for reproducing recorded *sound*.

**Sound speed.** Sound speed is the movement of ciné film at the rate of 24 *frames* per second. Thus, with 16 mm. film this equals 36 feet per minute and with 35 mm. film, 90 feet per minute.

**Sound stage.** The term for a *stage* that has been soundproofed to make it suitable for the recording of *sound*.

**Sound track.** The *sound* record on film or *magnetic tape*. (See also *Variable area sound track*, *Variable density sound track*, *Full track* and *Half track*.)



**Sound truck.** A mobile *sound* recording unit, usually with its own power supply.

**Sound wave.** See *Sound*.

**Sound work print.** A.S.A. Z22. 56-1947 3.3.2. A sound work print is a *sound print* which usually consists of intercut *sound daily prints*, but may also include other *sound tracks* of *sound effects* or music, or both, on the same or separate films with *synchronism* constantly maintained with the corresponding *picture work print*.

**Speaker.** See *Loudspeaker*.

**Special effects.** The scenic and dramatic effects in a film that are created on the *set*, as opposed to the *laboratory*.

**Spectral emissivity.** A.S.A. Z7. 1-1942 10.065. The spectral emissivity of an element of surface of a *temperature radiator* at any *wavelength* is the ratio of its *radiant flux density* per unit *wavelength* interval (spectral radiancy), at that *wavelength*, to that of a *blackbody* at the same temperature.

**Spectral radiant energy.** Spectral radiant energy is the radiant energy per unit *wavelength* interval and is measured in *ergs per micron*.

**Spectral radiant intensity.** Spectral radiant intensity is the radiant intensity per unit *wavelength* interval and is measured in *watts per steradian per micron*.

**Spectrum.** A *band* of *wavelengths* of stated *frequency* variation between defined limits. There are three such *bands* of interest in vision and *sound*, these being listed below.

(1) **AUDIO SPECTRUM.** This *band* contains the *sound* frequencies that can be distinguished by the human

ear. The least is about 30 cycles per second, which is a very deep note and the *sounds* become shriller until the upper limit of about 17,000 cycles per second is reached. This latter *frequency* is only just on the verge of detection of the human ear and the actual limits for any person will vary considerably, according to age, health, etc. (See *Audio frequency* also.)

(2) **ELECTROMAGNETIC SPECTRUM.** This *band* covers a very wide range of frequencies, wherein the radiation travels at 186,000 miles (app. 300,000 kilometres) per second. The range in order of increasing *wavelength* includes the following: cosmic rays, X-rays, ultra-violet rays, visible *light rays*, infra-red rays and radio waves.

(3) **VISIBLE SPECTRUM.** Visible *light* covers the range of *wavelengths* from about 4,000 A.U. to about 7,200 A.U. In order of increasing *wavelengths*, the colours are: violet, blue, green, yellow and red. Below violet, there is ultra-violet and above red, there is infra-red, both of these outer-range radiations being invisible to the human eye.

**Specular reflection.** See *Regular reflection*.

**Splice.** The join made between two lengths of film, usually through the medium of *film cement*.

**Splicer.** A mechanical device used to *splice* film.

(1) **HAND SPLICER.** The hand splicer is simple in construction and is operated entirely by hand, making use of the natural jointing action of *film cement* when the *splice* is held under pressure.



- (2) **MACHINE SPLICER.** A larger unit designed for continuous use and operated by both hands and feet.
- (3) **HOT SPLICER.** A heavy duty splicing machine in which heat assists the rapid drying of the *film cement* in the *splice*.

**Split reel.** A film *reel* with a removable side, thus allowing film that is unspooled or on a *core* to be mounted on the spindle, and wound film to be withdrawn without rewinding.

**Split-screen.** The technique whereby the same *subject* is shown duplicated in a *frame*, or *action* in a number of distinctively separate *locations* is shown in the same *frame*. In filming, this effect is usually obtained by *multiple exposure* or *multiple printing* from suitably masked *negatives*.

**Spool.** See *Reel*.

**Spotlight.** A *lighting unit*, usually incorporating a *lamp* focussing mechanism, a high efficiency *reflector* and a *condenser lens*, that enables a narrow well defined beam of *light* to be obtained as required. By means of the focussing mechanism, when fitted, the beam can also be widened to give a broad floodlight effect.

**Sprockets.** The toothed wheels used in various types of film handling machinery to propel the film by engaging in the film *perforations*.

**Squeeze track.** A.S.A. Z24. 1-1951 8.270. A squeeze track is a *variable density sound track* wherein, by means of adjustable masking of the recording *light beam* and simultaneous increase of the electrical *signal* applied to the *light modulator*, a track having variable width with greater *signal-to-noise ratio* is obtained.

**Stage.** That part of a *studio* in which a *production* is actually filmed.

**Standard candle.** See *Candle*.

**Standard leader.** See *Academy leader*.

**Still.** A photographic paper print or individual *transparency*.

**Stock.** See *Raw stock*.

**Stock shot.** A *shot* taken from the material held by a *film library*.

**Stop.** See *Aperture*, *f-Number* and *T-Stop*.

**Stop motion.** The technique of exposing a film one *frame* at a time. This method is employed for many types of *animation*, the object to be animated being moved a little between each *frame shot*, or being re-drawn in a slightly different position.

**Stopping down.** The process of reducing the *aperture* of a *lens*.

**Story-board.** A collection of drawings of the main incidents or action changes in a *production*, together with the associated dialogue and the main camera and *sound effect* directions.

**Strike.** The dismantling and removal of the *scenery* and *props* constituting a *set*.

**Studio.** The chamber used for filming a *production* and which is suitably equipped for that purpose. The term also means, in both the singular and plural, the collection of buildings devoted to film *production*.

**Subject.** The persons, scene or other matter being filmed at any particular time, with reference to a particular camera.

**Sub-standard gauge.** See *Gauge*.



**Superimposition.** The technique whereby a number of picture *images* are shown overlapping when viewed on a projection *screen*.

**Supersonics.** The term supersonics covers matters appertaining to speeds in excess of that of *sound*. The term should not be confused with *ultrasonics*.

**Sync.** Abbreviation for *Synchronism*.

**Sync marks.** The marks made on picture and *sound track* films to show their synchronous relationship.

**Synchronization.** Synchronization is said to exist when a number of independent variables have been so related as to be in *synchronism*.

**Synchronizer.** A machine employed in film *cutting* that has linked *sprocket* wheels by means of which picture and *sound* films can be wound on to *reels* in *synchronism*.

**Synchronism.** The concurrence of two or more events in time, such that they are in exact coincidence with one another.

**Synchronism (film).** A.S.A. Z22. 56-1947 1.5. Synchronism is the relation between the picture and *sound* films with respect either to the physical location on the film or films, or to the time at which corresponding picture and *sound* are seen and heard. (See also *Camera synchronism*; *Editorial synchronism* and *Projection synchronism*.)

**Synchronous speed.** The speed at which *sound* and picture cameras are operated for recording, and *projectors* for projection of film, in order to ensure a faithful rendering of the *original scene*. This speed is standardized at 24 *frames*

per second for *sound* films. This is equivalent to 90 feet per minute with 35 mm. film and 36 feet per minute with 16 mm.

**Synopsis.** Otherwise *Outline*. The brief written outline of the main *action* and sequence of events in a *production*.

**T-Stop.** The *aperture* of a *lens* expressed in terms of its *light* transmitting power. This is the latest method of designating *lens apertures* and is gradually replacing the *f-Number* system.

**Tail-out.** Otherwise *Tail-Up*. The term for a ciné film wound so that the last *frame* in sequence is on the outside. (See *Head-out*.)

**Tail-up.** See *Tail-out*.

**Take.** A single continuous *shot* made by a camera. In filming, each take in a *scene* is numbered from one upwards and the number is recorded on the *slate* to assist identification in *printing* and *cutting*.

**Take-off spool.** The *spool* from which film is run off during *shooting*, *processing*, projection or other handling.

**Take-up spool.** The *spool* on to which film is run during *shooting*, *processing*, projection or other handling.

**Tape recorder.** See *Magnetic recorder*.

**Telecast.** A television broadcast.

**Teleciné.** The term applied to apparatus designed to project cine films for television transmission.

**Telephoto lens.** Strictly speaking, a telephoto lens is a *lens* with an effective *focal length* much greater than its



back *focus*. However, the term is commonly applied to any *lens* with a much greater *focal length* than is usual for the camera in question. The effect of a telephoto lens is to act rather like a telescope for the camera "eye".

**Teleprompter.** The trade name for a machine that exhibits the *script* printed in large letters to the performers during a *production*. The words appear on continuously moving rolls of paper mounted in frames and can be viewed both directly and by reflection. A number of machines can be connected and run in synchronism, so that the *performers* are always able to keep the *script* in sight. (See *Autocue* also.)

**Telerecording.** Otherwise *Kinescope Recording* or *Teletypewriting*. A film record made of the *image* on a television *receiver tube*, usually with a record of the associated *sound* also.

**Teletypewriting.** See *Telerecording*.

**Television and Screenwriters Guild.** A trade union, representative of British screen and television writers, formed by the *Society of Authors*.

**Television film leader.** A film *leader* originally proposed by the *S.M.P.T.E.* in 1951 (then called *Society leader*) and now generally adopted on all films intended for television transmission in Great Britain and the U.S.A.

**Temperature radiator.** A.S.A. Z7. 1-1942 10.050. A temperature radiator is one whose *radiant flux density* (radiancy) is determined by its temperature and the material and character of its surface, and is independent of its previous history.

**Threading.** The fitting of a length of

film to the *sprockets* and guides of a camera, *processing*, projection or other film handling machine, before it is put into operation.

**Throat microphone.** A.S.A. Z24. 1-1951 10.150. A throat microphone is a *microphone* normally actuated by mechanical contact with the throat.

**Threshold of audibility (threshold of detectability).** A.S.A. Z24. 1-1951 5.040. The threshold of audibility for a specified *signal* is the minimum effective *sound pressure* of the *signal* that is capable of evoking an auditory sensation in a specified fraction of the trials. The characteristics of the *signal*, the manner in which it is presented to the listener, and the point at which the *sound pressure* is measured must be specified.

Note 1. Unless otherwise indicated, the ambient *noise* reaching the ears is assumed to be negligible.

Note 2. The threshold may be expressed in *decibels* relative to 0.0002 microbar or to 1 microbar.

Note 3. Instead of the method of constant stimuli, which is implied by the phrase "a specified fraction of the trials", another psychophysical method (which should be specified) may be employed.

**Throw.** In relation to film picture projection, throw is the distance between the *projector lens* and the screen on which the *image* is viewed.

**Throw-it-away.** The injunction to a performer to speak a line of dialogue in a conversational manner and without special emphasis.

**Tight shot.** A *shot* in which the *frame* cuts close to the limits of the immediate camera *subject*.



**Title.** The name, *credits* and other information that precedes and/or follows the subject content of a film.

**Title negative.** A.S.A. Z22. 56-1947 2.2.4. A title negative is a picture *negative* which is exposed to a *title* card or to both a *title* card and *background*.

**Toe of an H & D curve.** The toe of an *H & D curve* is the non-linear portion which lies below the straight line section of the curve.

**Tone range.** The term tone range refers to the number of different reflection or transmission densities between, and including, the greatest and the least in the viewed parts of the *subject* or its *image*. If the difference between the greatest and least tones is small, the *contrast* is said to be low and if the difference is great, the *contrast* is said to be high.

If the tone range is restricted to the lighter-toned end of the *grey scale*, then the *subject* or *image* is said to be in a *high key*. If, however, the tone range is restricted to the darker-toned end of the *grey scale*, then the *subject* or *image* is said to be in a *low key*.

**Top light.** *Light* directed on the *subject* from above. (See *Lighting* also.)

**Total emissivity.** A.S.A. Z7. 1-1942 10.060. The total emissivity of an element of surface of a temperature radiator is the ratio of its *radiant flux density (radiancy)* to that of a *black-body* at the same temperature.

**Total flux.** The total flux of a source is the flux from that source in all directions.

**Tracking.** See *Dollying*.

**Transducer.** A.S.A. Z24. 1-1951 3.020.

A transducer is a device capable of being actuated by *waves* from one or more transmission systems or media and of supplying related *waves* to one or more other transmission systems or media.

**Note.** The *waves* in either input or output may be of the same or different types (e.g. electric, mechanical, or acoustic).

**Transition.** The process of movement between *shots*, types of *action* or mood by whatever means.

**Transition focus.** The method whereby the picture viewed is put temporarily *out-of-focus* in order to achieve a *transition* effect between *shots*.

**Translucent screen.** See *Screen*.

**Transmission.** In electrical terminology, transmission is the means whereby intelligence is conveyed through the passage of an electrical current.

**Transmission (transmittance).** A.S.A. Z24. 1-1951 8.315. Transmission, as applied to photographic recording, is the ratio of the *light* flux transmitted by the medium to the *light* flux incident upon it. Transmission may be either diffuse or specular. (See *Diffuse transmission* and *Regular transmission* also.)

**Transmission factor.** The transmission factor of a body is the ratio of the *light* transmitted by the body to that falling upon it. (See *Diffuse transmission factor* and *Regular transmission factor* also.)

**Transmission loss.** In communication, transmission loss (frequently abbreviated to "loss") is a general term denoting a decrease in power in transmission from one point to another.



**Transmittance.** A.S.A. Z7. 1-1942 30.126. The transmittance of a body is the ratio of the *light* reaching the second surface of the body to the *light* which enters the surface where it is incident.

(Note. This definition and that for *transmission factor*, are similar to that given above for *transmission* (*transmittance*). There is no official agreement on a single definition or group of definitions at the present time and so all three have been given here.)

**Transparency.** A photographic or other *slide* consisting of a still picture, drawing or design, suitable for projection, or alternatively display with back-lighting.

**Transparent glass.** A.S.A. Z7. 1-1942 30.255. Transparent glass is glass having no apparent diffusing properties. Varieties of such glass are sometimes referred to as flint, crystal, clear.

**Travelling masks.** See *Matte rolls*.

**Travelling mattes.** See *Matte rolls*.

**Travelling shot.** See *Dollying*.

**Treatment.** The detailed story outline for a *production*, but without precise camera instructions. This is the scripting stage intermediate between a *synopsis* and a *shooting script*.

**Tri-acetate base.** See *Cellulose triacetate base*.

**Trial print.** See *Answer print*.

**Trims.** See *Outs*.

**Tripod.** A three-legged support for a camera, *projector*, or other apparatus. Tripods are usually capable of being easily dismantled for travelling and are

often light enough to be carried by one man without difficulty.

**Trucking.** See *Dollying*.

**Turret.** See *Lens turret*.

**Two-shot.** A *tight shot* of two people.

**U.H.F.** Abbreviation for *Ultra-High Frequency*.

**Ultra-High Frequency.** Abbreviated to *U.H.F.* The *frequency band* from about 300 to 3,000 *megacycles* per second. This *band* contains *channels* 14 to 83.

**Ultrasonic frequency.** An ultrasonic frequency is a *frequency* lying above the *audio frequency* range.

**Ultrasonics.** A.S.A. Z24. 1-1951 4.005. Ultrasonics is the general subject of *sound* in the *frequency* range above about 15 *kilocycles* per second.

**Unblooped.** The term applied to a film that has a *sound track* which has not had any *bloop* applied to it after splicing.

**Undeveloped.** The term applied to film that has not yet passed through the *development* stage of *processing*.

**Unidirectional illumination.** A.S.A. Z7. 1-1942 35.005. Unidirectional illumination on a surface is that produced by a single *light* source of relatively small dimensions. It is characterized by the fact that a small opaque object placed near the illuminated surface casts a sharp shadow.

**Unidirectional microphone.** A.S.A. Z24. 1-1951 10.060. A unidirectional microphone is a *microphone* which is responsive predominantly to *sound* incident from one hemisphere.



**Unilateral-area track.** A.S.A. Z24. 1-1951 8.285. A unilateral-area track is a *sound track* in which one edge only of the opaque area is modulated in accordance with the recorded *signal*. There may, however, be a second edge modulated by a *noise-reduction* device.

**Unit manager.** The person in charge of the ordinary business management of a *production unit* when it is on *location*.

**Units of brightness.** A.S.A. Z7. 1-1942 05.070. The practice recognized internationally is to express *brightness* in *candles* per unit area of surface. The *brightness* of any surface, in a specified direction, can also be expressed in terms of the *lumens* per unit area from a perfectly diffusing surface of equal *brightness*.

**Variable-area track.** A.S.A. Z24.1-1951 8.280. A variable-area track is a *sound track* divided laterally into opaque and transparent areas, a sharp line of demarcation between these areas forming an oscillographic trace of the *wave* shape of the recorded *signal*.

(Note. This is the system of recording used extensively by R.C.A.)

**Variable-density track.** A.S.A. Z24. 1-1951 8.295. A variable-density track is a *sound track* of constant width and usually, but not necessarily, of uniform *light transmission* on any instantaneous transverse axis and of which the average *light transmission* varies along the longitudinal axis in proportion to some characteristic of the applied *signal*.

(Note. This is the system of recording used extensively by Westrex.)

**Variable focus lens.** A type of *lens* that can be altered in *focal length* by the re-positioning of its component parts, or the addition or subtraction of component or other parts. (See *Zoom Lens* also.)

**Variable-reluctance microphone** (magnetic microphone) (electromagnetic microphone) (moving iron microphone). A.S.A. Z24. 1-1951 10.090. A variable-reluctance microphone is a *microphone* which depends for its operation on variations in the reluctance of a magnetic circuit.

**Velocilator.** A mobile camera support intermediate in type between a *dolly* and a *camera crane*.

**Velocity microphone.** A.S.A. Z24. 1-1951 10.015. A velocity microphone is a *microphone* in which the electric output substantially corresponds to the instantaneous particle velocity in the impressed *sound wave*.

Note. A velocity microphone is a *gradient microphone* of order one and it is inherently bidirectional.

**Very-High Frequency.** Abbreviated to *V.H.F.* The *frequency band* from about 30 to 300 *megacycles* per second. This *band* contains channels 1 to 13.

*V.H.F.* Abbreviation for *Very-High Frequency*.

**Vibration.** See *Oscillation*.

**Video-tape.** The system of recording and playback of television pictures through the medium of *magnetic tape* that has been developed by the Radio Corporation of America. A number of similar systems are also being developed by other organizations and it is clear that this method of *tele-recording* will eventually supplant the



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film techniques now employed. *N.B.* *sound levels* are amplified less than low *sound levels*.  
The term "video-tape" is frequently used as generic for all methods of recording television signals on *magnetic tape*.

**Vidicon.** The trade name for the small photoconductive *camera tube* developed by R.C.A. and used in industrial cameras and film and *transparency* transmission units.

**Viewer (film).** An optical device that can be fitted on the base of a *rewinder* and which produces a magnified *image* when the film is passed through it.

**Viewfinder.** The device fitted to a camera in order that the *subject* included within the angle of view of the camera *lens* can be seen with some accuracy.

**Viewpoint.** See *Camera angle*.

**Visible spectrum.** See *Spectrum*.

**V.O.** Abbreviation for *Voice-Over*.

**Voice-over.** Abbreviated to *V.O.* Narration other than lip-synchronized speech and usually delivered without the narrator being seen on screen at the time when his voice is heard.

**Volume.** The volume in an electric circuit is the magnitude, as measured on a standard volume indicator, of a complex voice *frequency wave*. The term "volume" is also commonly applied to the intensity of a *sound* or the magnitude of an *audio frequency wave*.

**Volume compression.** The system in *sound* recording whereby the level of the *signal* passing through an amplifier is arranged to control the *gain* of the amplifier in such a way that high

**VU meter.** Abbreviation for "volume unit" meter. A meter which indicates the relative levels of the various sounds being recorded in a recording system, by measuring the electrical voltages.

**Walk-on.** An artiste employed to make an individual appearance in a film or *telecast*, but who does not speak any lines and may only be seen for a very short while. (See *Extra* and *Performer* also.)

**Walk-through.** See *Dry run*.

**Wardrobe mistress.** The person in charge of the supply and fitting of all studio supplied clothing for the cast of a film.

**Watt.** The basic unit of electrical power. One watt is defined as the energy expended per second by an unvarying electric current of one ampere across a potential difference of one volt. The power in watts is given by the product of the current in amperes and the potential difference in volts.

**Wave.** The term wave is applied to the regular periodic motion of a particle, or a single *cycle* thereof.

**Wave filter (filter).** A.S.A. Z24. 1-1951 3.090. A wave filter is a *transducer* for separating *waves* on the basis of their frequency. It introduces relatively small insertion loss to *waves* in one or more *frequency bands* and relatively large insertion loss to *waves* of other frequencies.

**Wavelength.** A.S.A. Z24. 1-1951 1.090. The wavelength of a periodic *wave* in an isotropic medium is the perpendi-



cular distance between two *wave* fronts in which the displacements have a difference in phase of one complete period.

**Waxing.** The method whereby wax is applied to the edges of film *projection prints* in order to ensure smooth running in use.

**Wide-angle lens.** A normal *lens* for a camera has a *focal length* roughly equal to the diagonal of the *image* forming surface in the camera. Any *lens* of shorter *focal length* than normal will give a wider angle of view and is, therefore, a wide-angle lens with respect to that particular camera. The specially made wide-angle lenses have angles of view as wide as 100°, compared with the "normal" of about 53° and they preserve a high degree of definition even to the edges of the picture.

**Wild motor.** The term applied to a motor that is being run at other than *synchronous speed*.

**Wild track.** A *sound track* made without being synchronized to a picture.

**Window glass.** A.S.A. Z7. 1-1942 30.265. Window glass is transparent,

relatively thin, flat glass having glossy, fire-finished, apparently plane and smooth surfaces, but having a characteristic waviness of surface which is visible when viewed at an acute angle or in reflected *light*.

**Wipe.** An *optical* effect resulting in one *scene* progressively replacing that originally viewed.

**Work print.** See *Picture work print* and *Sound work print*.

**Wow.** Distortion caused by a periodic variation in speed of the tape, film or disc in a *sound reproducing system*.

**Zoom.** The technique whereby the *subject* is brought rapidly into *close-up* from a *long shot* in one continuous movement.

**Zoom lens.** A *lens* that enables a *zoom* effect to be obtained in one continuous smooth movement, through a rapid increase in *focal length* over a set range. This is accomplished without the subject becoming *out-of-focus*, or the *lens focus* controls being adjusted during the *zoom* movement.



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— QUALITY CONTROL AND SENSITOMETRY  
PRINTING MOTION PICTURE FILM  
THE MOTION PICTURE PROJECTOR  
THE ADDITION OF SOUND  
SOUND FILM PROCESSING  
SOUND REPRODUCTION  
THE REDUCTION PRINTING PROCESS  
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## PHOTOFACTS

|                                                |     |
|------------------------------------------------|-----|
| 1. The Camera .. .. .                          | 2/6 |
| 2. Focusing .. .. .                            | 2/6 |
| 3. Exposing .. .. .                            | 2/6 |
| 4. Colour Filters .. .. .                      | 2/6 |
| 5. Composing the Picture .. .. .               | 2/6 |
| 6. Outdoor Portraiture .. .. .                 | 2/6 |
| 7. Landscape Photography .. .. .               | 2/6 |
| 8. Seaside Photography .. .. .                 | 2/6 |
| 10. Developing the Film .. .. .                | 2/6 |
| 11. Contact Printing .. .. .                   | 2/6 |
| 12. Enlarging .. .. .                          | 2/6 |
| 13. Developing the Print .. .. .               | 2/6 |
| 14. Holiday Photography .. .. .                | 2/6 |
| 15. Outdoor Lighting Effects .. .. .           | 2/6 |
| 16. Lantern Slides and Transparencies .. .. .  | 2/6 |
| 17. Artificial Lighting .. .. .                | 2/6 |
| 18. Flash Photography .. .. .                  | 2/6 |
| 20. Action Photography .. .. .                 | 2/6 |
| 21. Exposure Meters .. .. .                    | 2/6 |
| 23. Negative Faults .. .. .                    | 2/6 |
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